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ULUNDI MUNICIPALITY

ULUNDI LOCAL MUNICIPALITY

STRATEGIC ENVIRONMENTAL ASSESSMENT

STRATEGIC ENVIRONMENTAL ASSESSMENT PLAN

REVIEW 2026 - 2027

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ACRONYMS

BRG	Bio Resource Group
BRU	Bio resource Unit
CBA	Critical Biodiversity Areas
CMA	Catchment Management Agencies
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
ESAs	Ecological Support Areas
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
I&APs	Interested and Affected Parties
IWMP	Integrated Waste Management Plan
LM	Local Municipality
LTAS	Long Term Adaptation Scenarios Flagship Research Programme
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Areas
NWA	National Environmental Management: Water Act
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
Stat SA	Statistic South Africa
WWTW	Waste water treatment works

1. Introduction

Ulundi Local Municipality (LM) has embarked on a process to develop the Strategic Environmental Assessment (SEA) for the area under its jurisdiction. The SEA is expected to culminate into the Strategic Environmental Management Plan (SEMP).Green Diamond Environmental Consulting was appointed to develop the Ulundi SEA.

2. Study Area

Ulundi LM is one the five LMs, other four LMs being eDumbe, Abaqulusi, Nongoma and uPhongolo, constituting the Zululand District. It is located on the southern boundary of the Zululand District Municipality in the north-eastern part of KwaZulu-Natal, as shown in Figure 1. The municipal area is approximately 3,250 km^2 in extent and includes the towns and settlements of Ulundi, Nqulwane, Mahlabathini, Babanango, Mpungamhlophe and Ceza as well as nine Traditional Authorities of Buthelezi, Mbatha, Mpungose, Ndebele, Nobamba, Ximba, Zungu, Nsimbi, Buthelezi-Emphithiphithini. It consists of 24 wards. The Ulundi LM is the administrative centre and seat for the Zululand District Municipality and a well-equipped airport.

The largest part of its area is rural and underdeveloped. Approximately half of the Municipal area consists of commercial farms and the area supports a substantial agricultural community. The town of Ulundi represents the only urban centre in the Ulundi LM area and accommodates approximately 40,000 people. It is situated on the R66 which connects Ulundi directly to Nongoma in the North and Melmoth to the south, then leading to the N2 which connects the town to the coastal cities. The town of Ulundi is the only formal urbanised node and houses all formal (first economy) economic activities within the municipality. The areas surrounding the town of Ulundi are characterised as large, densely populated tribal areas with an informal settlement pattern. These areas are completely reliant on Ulundi for employment, goods and services. Due to the high population density, concentration and service demands, large sections of these tribal areas can be classified as emerging urban settlements.

Figure 1: Locality Map

3. Objectives of the Project

According to the ToR, the Ulundi LM aims at developing the SEA, as part of the Integrated Development Plan (IDP) and Spatial Development Framework (SDF) that will guide future development. The SEA must have a set of objectives, strategies and policy guidelines that directs development and development options to ensure that the envisaged long-term urban and rural structure and target deliverables are realized.

The Ulundi LM objectives of developing the SEA are as follows:

- Define and spatially represent the current state of the environment in the study area
- Identify environmental opportunities and constraints; the identification of areas in need of protection and areas having activities that are potential threats to the environment.
- Identify the development trends and strategic land use patterns that are influencing the state of the environment within the LM.
- Identify the social, economic and biophysical resources that should be maintained and enhanced.
- Through consultation with relevant interested and affected parties, determine the desired state of the environment and permissible limits to change for the LM
- To sustain the continued benefits of ecosystem goods and services provided by vulnerable ecological resources in the local municipality
- Develop the environmental monitoring and implementation plan to measure the success of the SEA.

3.1. Defining SEA

There is currently no internationally accepted definition of the SEA. It is, however, commonly referred to as a process for assessing the environmental consequences of Processes, Plans, Programmes (CSRI, 2007). SEA aims to ensure that environmental issues are addressed from an early stage in the process of formulating plans and programmes, and incorporated throughout this process. The approach of assessing the effect of the environment on development is an important benefit of SEA. This is one of the differences between SEA and Environmental Impact Assessment (EIA), as EIAs focus on the effect of development on the environment (DEAT and CSIR, 2000).

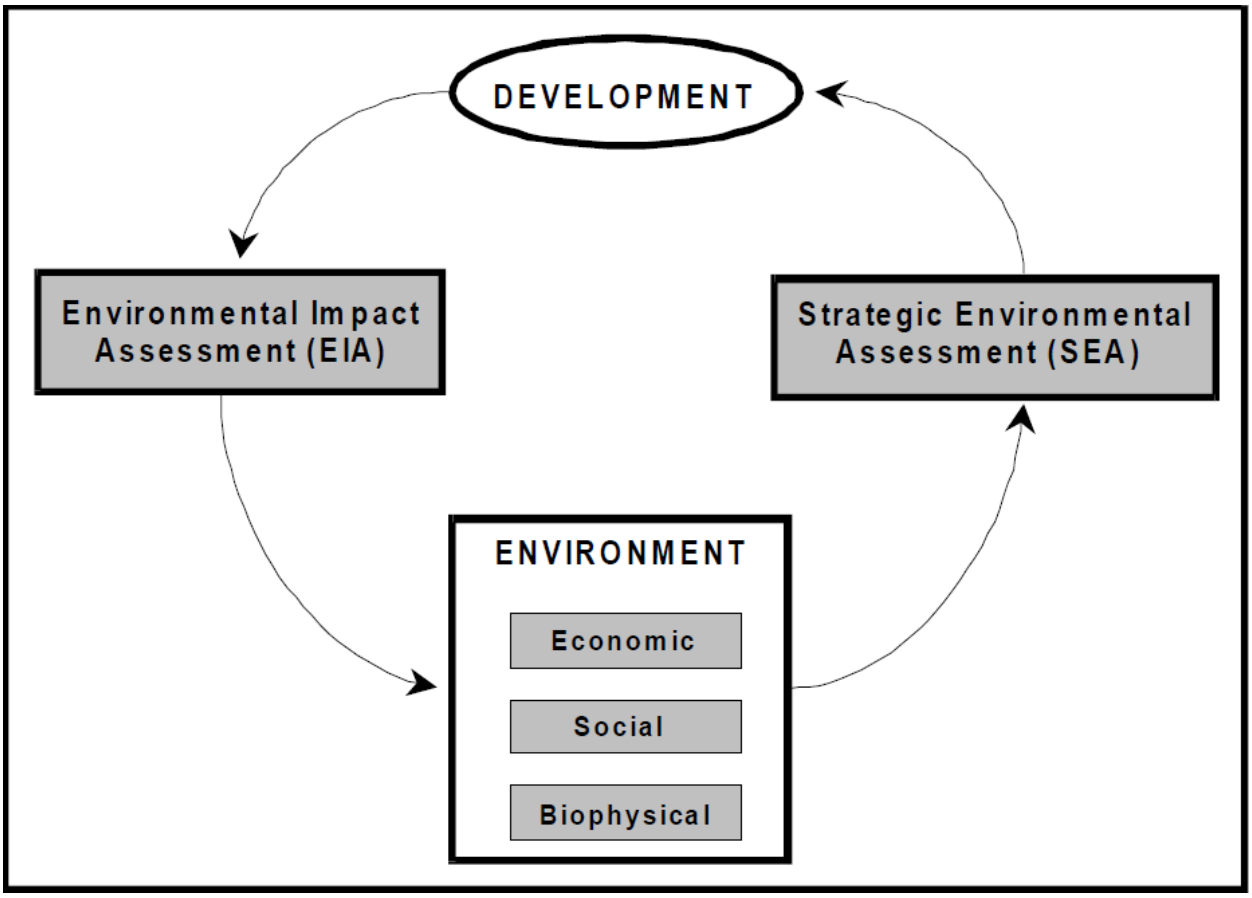


Figure 1: Difference in focus between SEA and EIA

Source: DEAT and CSIR (2000)

The difference in emphasis between SEA and EIA are summarized in Table 1, below:

Table 1: Comparison between EIA and SEA

EIA	SEA
Is reactive to a development	Is pro-active and informs development proposals
Is used to assess the effect of a proposed development on the environment and socio-economic conditions.	Is used to assess the effect of the existing environmental and socio-economic conditions of development opportunities and constraints.
Relates to a specific project	Relates to areas, regions or sectors of development
Enables the identification of project specific impacts	Enables the development of a framework against which positive and negative impacts can be measured
Has a well-defined beginning and end, focuses on informing a specific decision at a particular point in time.	Is a process aimed at the development of a sustainability framework to inform continuous decision over a period of time

Is focused on the mitigation of negative impacts and the enhancement of positive impacts	Is focused on maintenance of a chosen level of environmental quality and socio-economic conditions (e.g. through the identification of sustainability objectives and limits of acceptable change)
Has a narrow perspective and includes a high level of detail	Has a wide perspective and includes a low level of detail to provide a vision and overall framework

Source: DEAT (2004)

3.2 What makes SEA Strategic?

According to CSRI (2007), the strategic nature of SEA is a function of how it is applied (i.e. the process of SEA), its outcomes and its interaction with the decision-making process. The characteristics of SEA that define its strategic nature are outlined as follows:

1) SEA emphasizes strategy

The SEA process can be used to formulate a strategy for action that incorporates sustainability objectives, targets and indicators.

2) SEA is set within the context of broader visions, goals and objectives

The 'integrated' model or 'objectives-led' model of SEA typically includes the identification of a vision of the desirable future. Once a vision is articulated, goals and objectives are defined and alternative means of achieving those goals and objectives are evaluated. The goals, objectives and the alternatives are the means to the end (the end being the desired future).

3) SEA asks the question: what is the preferred option? (i.e. SEA is proactive)

The preferred option is the strategic choice or strategic decision. For example, a policy may have a stated preference of renewable energy technologies over fossil fuel or nuclear technologies. EIAs on the other hand consider the impacts of different option alternatives at the project level, rather than at the strategic (ie. policy, plan or programme) level. EIAs are applied once strategic decisions have already been made (for example the preference for coal-fired power stations).

4) SEA sets objectives, targets, criteria and indicators for sustainability

Objectives are the specific aim, purpose, intent or mission that needs to be accomplished. Targets are certain quantified milestones to be reached. They may contain a specified timetable. Criteria are the

specific parameters, guidelines or standards that must be met (i.e. the limit of environmental change). Indicators are specific measurable that help track progress towards a target or goal.

a. Principles of SEA

The principles are the fundamentals premises underpinning SEA methodologies in South Africa. They provide the theoretical base for the development of local SEA processes. The principles can assist in the integration of SEA into other planning and environmental processes and in the evaluation of the effectiveness of SEA methodologies.

Table 2 below contains the principles for the SEA in South Africa, their implications for SEA Guidelines, and questions to assist in the development and evaluation of a SEA. The principles are consistent with those underpinning the Integrated Environmental Management, but were formulated specifically for the development of an agreed approach to SEA in South Africa. The SEA principles and process guidelines are also set within the context of NEMA.

Table 2: Principles, their Implications and Key Questions for SEA

PRINCIPLE	IMPLICATION	KEY QUESTION
	SUBSTANTIVE/CONTENT PRINCIPLES	
1. SEA is driven by the concept of sustainability	The focus of SEA is on integrating the concept of sustainability into the objectives and outcomes of plans and programmes. Sustainability objectives are applicable to the level, scale and sector of the plan or programme, as well as to the environmental resources to be sustained. The sustainability objectives should be developed with the participation of I&APs. Targets and measurements tools are defined to guide development towards sustainability	How can the concept of sustainability be integrated into different levels of decision-making, within the spatial context of the plan or programme?
2. SEA identifies the opportunities and constraints which the environment places on the development of plans and programmes.	The environmental resources needed to achieve the sustainability objectives are identified. These resources are maintained and enhanced through the plan or programme. The resources are prioritized through effective participation procedures. The environmental resources form the basis for the basis for the identified of opportunities and constraints, which guide the formulation	What are the environmental resources which should be maintained and/or enhanced in the plan or programme?

	of plans and programmes.	
3. SEA sets the criteria for levels of environmental quality or limits of acceptable change	The levels of acceptable change of the environmental resources are determined. This process reflects public views and scientific information. The plan or programme is developed in such a way as to maintain and enhance the level of environmental quantity and quality of these alternatives and predicting whether the resources will be maintained and enhanced. Management programmes are identified. These are implemented should the limits of acceptable change of the environmental resources be exceeded, or are threatened to be extended.	What is the level of acceptable change of the
PROCEDURAL PRINCIPLES		
4. SEA is flexible process which is adaptable to the planning and sectoral development cycle	SEA is integrated into existing process for plan and programme formulation and implementation. There is not one SEA process to be used in all contexts, but different processes for various contexts and strategies tasks. The focus is on understanding the context-specific decision making and plan or programme formulation procedure. The objectives of sustainability are then integrated into this process at key decision points, throughout the various levels and scales of plan and programme development. The SEA consistently interacts with plan and programme procedure in an iterative way	How can sustainability objectives be integrated affectively into existing context-specific processes for plans and programmes?
5. SEA is strategic process, which begins with the conceptualization of the plan or programme	SEA introduces sustainability objectives at the earliest stage in the plan or programme process, from conceptualization through to the many stages of decision-making.	How can sustainability objectives be integrated into the plan or programme, starting from the stage of conceptualization?
6. SEA is part of a tier approach environmental assessment and management	SEA addresses higher levels of decision-making in order to provide the context for lower levels Linkages are established between the various levels of decision-making.	What are the plans or programmes which influence the maintenance and enhancement of the environmental resources identified?
7. The scope of an SEA is identified within the wider context of environmental processes.	SEA is not limited to a particular site, but considers significant local, regional, national and international linkages.	What are the political, socio-economic, and biophysical processes influencing the maintenance and enhancement of the environmental resources

		identified?
8. SEA is a participative process	Participation processes are adapted to the specific socio-political context of the plan or programme The public participation process should inform and enhance the entire SEA process, in particular the scope and sustainability objectives of the SEA.	What level and type of participation is most appropriate to enable role players to engage in the process at a level that is appropriate to their needs and resources?
9. SEA is set within the context of the alternative scenarios	Scenarios, visions and alternative plan and programme options are developed in a particular way. Alternative plans and programmes are evaluated in terms of their ability to maintain and enhance the environmental resources identified.	What plan and programme alternatives will most effectively maintain and enhance the environmental resources identified?
10. SEA includes the concepts of precaution and continuous improvement	A risk-averse and cautious approach is applied which recognizes the limitations of current knowledge about the consequences of decision-making. This approach should be linked to a commitment to continuous learning and improvement. This link between a cautious learning contributes to an increasing understanding of sustainability for a region or sector. SEA must lead to the process for: Monitoring and continuous improvement; Improvement of baseline information; and Understanding of sustainability objectives.	What mechanism for the monitoring and evaluation of sustainability should be integrated into plan or the programme?

Source: DEAT and CSIR (2000)

3.3 The legislative development of the SEA

In South Africa, key concepts related to SEA were articulated in an SEA Primer and Protocol produced by the CSRI in 1996 and 1997, respectively. In 2000, the Department of Environmental Affairs and Tourism (DEAT) published guidelines on SEA in South Africa. In conjunction with the production of these documents several SEA processes were undertaken which were followed a variety of approaches.

The National Environmental Management Act No. 107 of 1997 (NEMA) provides for the development of procedures for the assessment of the impact of policies, plans and programmes. The Municipal Planning and Perfomance Management Regulations of 2001 (Ch2, s2 (4) (f) promulgated in terms of the Municipal

Systems Act No 32 of 2000 indicates that the Spatial Developemnt Framework (SDF) reflected in the municipality's Integrated Development Plan (IDP) must contain a strategic assessment of the environmental impact of the SDF. The Spatial Planning and Land Use Management Act No. 16 of 2013 s21 (j) states that the municipal SDF must include the strategic environmental assessment of the environmental pressures and opportuniuties within the municipal area, including the spatial location oif environemntal sensitivities, high potentail agricultural and coastal access stris, where applicable. Only the coastal access strips is not applicable to Ulundi LM.

3.4 Approach and Methodology

Ulundi SEA will be undertaken in six phases as depicted in Figure 3, below. The first phase of the project which is the Inception Report was presented on the first Project Technical Committee (PTC) meeting held on Thursday, the 18th February 2021. The Inception Report provided the PTC with a refined project methodology, budget and timeframe. It included:

- Detailed information on the approach to various components of the project including detailed scope of work for the specialists assessments;
- Proposed timeframes to undertake the project;
- Identification of key deliverables of the project;
- A proposed communication strategy and reporting schedule;
- A detailed budget for the project; and
- Explanation of roles and responsibilities as outlined by law and or policy.

Currently, the project is at Phase 2 which is the Situational Analysis Report. The focus of the Situational Analysis Phase is on presenting the current state of the environment in Ulundi LM. It has been informed by, amongst other factors, the:

- Review of the relevant legal/policy framework;
- Review of available literature; and
- Stakeholder engagement

Relevant specialist studies have been undertaken to provide an understanding of the relationship between the municipality's biophysical and its social and economic components. Ground truthing has also been undertaken to assist in ensuring that that the Situational Analysis findings are accurate and reflects what is

really happening on the ground. Stakeholder engagement is the integral part in the preparation of the Ulundi SEA and Green Diamond will advertise the preparation of the Ulundi SEA in both local and provincial newspapers. The objectives of the advertisement are:

- To inform the public about the preparation of the Ulundi SEA;
- To enable Interested and Affected Parties (I&APs) to register as such in the project data base; and
- To invite I&APs to the Broader Stakeholder Workshop anticipated to be held during the Desired State phase of the project.

The preparation of the Ulundi SEA will be undertaken in six phases. Currently, the project is in phase 4 which is the Draft Strategic Environmental Management Plan. The project is expected to be completed in November 2021. The overall phasing of the project is depicted in Figure 2 below:

OUTLINE OF ULUNDI SEA

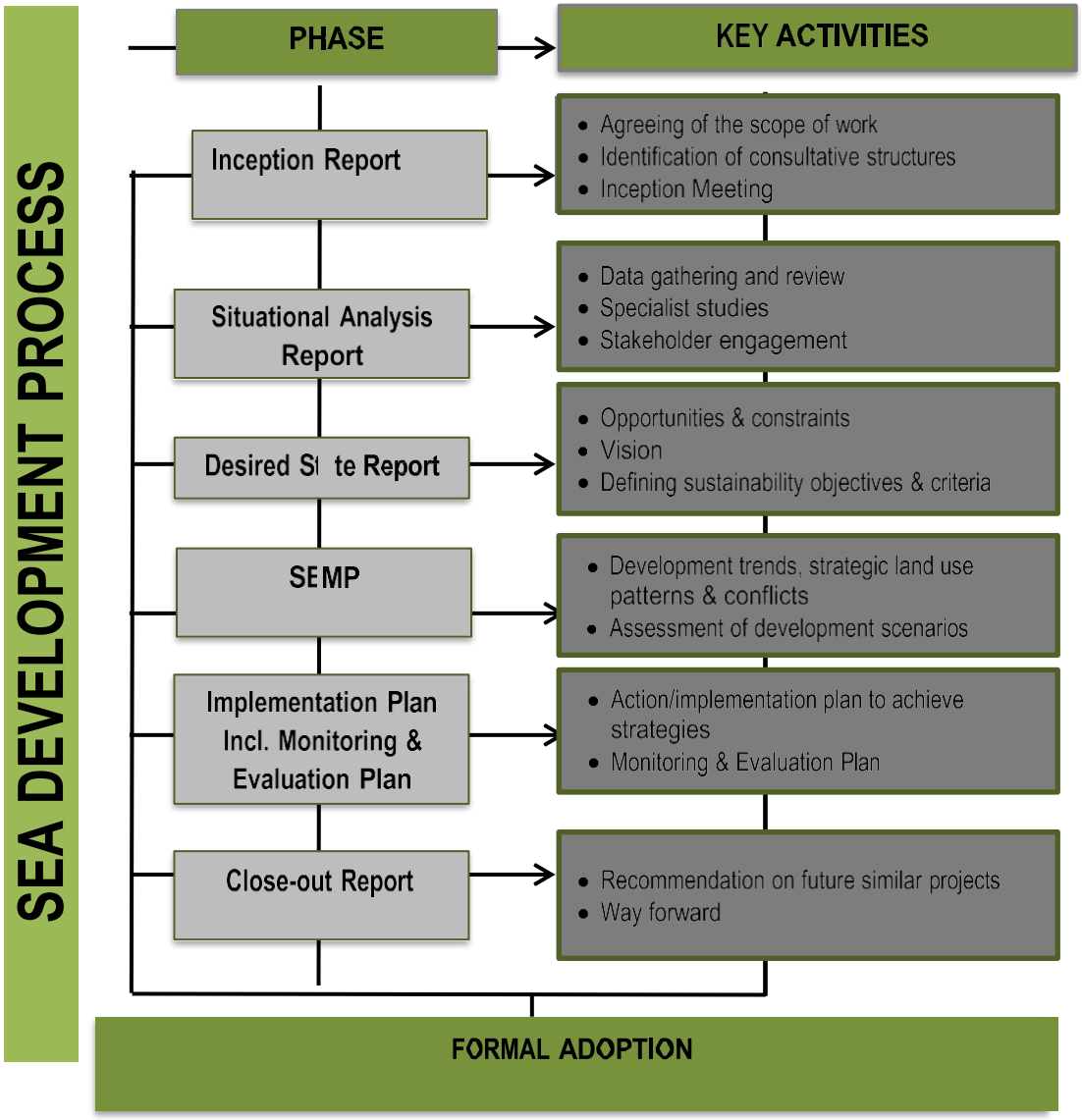


Figure 3: Outline of the Ulundi SEA

3.5 Purpose of the SEA Report

The purpose of the report is to build into the previously undertaken phases of the project by assessing the developments, trends and strategic land use patterns and conflicts. This will be informed by the review of planning tools, SDF, Land Use Management Scheme (LUMS) and Comprehensive Infrastructure Plan (CIP). The intention is for the outcomes from the SEA to be a key input into the SDF, LUMS and CIP and form the basis for assessing the sustainability of the development path in these plans in relation to ecological thresholds.

4 Legal and Policy Framework

4.1 South African Constitution of 1996

Section 24 of the South African Constitution sets out what is known as the 'Environmental Right'. It is composed of two parts, Section 24. The constitution indicates that:

'Everyone has the right –

(a) To an environment that is not harmful to their health or well-being; and

(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -

- (i) Prevent pollution and ecological degradation;
- (ii) Promote conservation; and
- (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.'

Furthermore, Section 157 of the Constitution provides for the objects of the local government which are indicated as follows:

(a) To provide democratic and accountable government for local communities;

(b) To ensure the provision of services to communities in sustainable manner;

(c) To promote social and economic development;

(d) To promote a safe and healthy environment; and

(e) To encourage the involvement of communities and community organisations in the matters of local government.

Millennium Development Goals

The Millennium Development Goals (MDGs) were the eight international development goals for the year 2015 that had been established following the Millennium Summit of the United Nations in 2000, following the adoption of the United Nations Millennium Declaration. South Africa is one of the member states who committed to help achieve the following Millennium Development Goals by 2015:

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

It is not all the eight MDGs that relates to the development of the SEA, MDG 7 – to ensure environmental sustainability is considered the relevant MDG to the SEA. This is because environmental sustainability is a core to sustainable development. The MDG 7 focuses on ensuring environmental sustainability and since the adoption of the MDGs, its targets and indicators have been reviewed within the context of other local, national and international development initiatives. The MDG 7 relates to integration of the principles of sustainable development into the municipal policies and programs thereby reversing the loss of environmental resources. It aimed at improving the proportion of the population with access to sustainable basic services such as water and sanitation.

4.2 National Environmental Management Act No 107 of 1997

The National Environmental Management Act (NEMA) is environmental management framework that provides for the environmental management in South Africa. It provides for cooperative governance by establishing principles for decision making on matters affecting the environment, institutions that will

promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

NEMA is in keeping with Sustainable Development. It directs that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably and emphasizes social sustainability. It indicates that development must be socially, environmentally and economically sustainable. NEMA provides a framework for 'integrating good environmental management into all development activities and governs environmental impact assessments generally and specifically regarding the 'specific environmental management Act'.

4.3 The National Development Plan, 2011

The National Planning Commission (NPC) has developed the National Development Plan: Vision for 2030 (NDP) for South Africa. It integrates previous strategic policies with new approaches to make the economy work better for all. The Diagnostic Report which was released in June 2011 set out South Africa's achievements and shortcomings since 1994. The plan focuses on addressing three relevant core challenges which are :(a) reducing poverty, (b) inequality and (c) unemployment. The following are a list of challenges which are the primary stimulators of the above mentioned three ills of the NDP:

- Too few people work;
- The standard of education for majority black learners is of poor quality;
- Infrastructure is poorly located, under-maintained and insufficient to foster higher growth;
- Spatial patterns exclude the poor from the fruits of development;
- The economy is overly and unsustainably resource intensive;
- A widespread disease burden is compounded by a failing public health system;
- Public services are uneven and often of poor quality;
- Corruption is widespread;
- South Africa remains a divided society.

Ulundi Local Municipality is characterized by high poverty levels and underdevelopment which need to be redressed within the context of sustainable environmental planning. As a result, there is a need for the Municipality to build just, fair, prosperous and equitable rural spaces that residents can proudly call home.

4.4 National Strategy for Sustainable Development and Action Plan

The National Strategy for Sustainable Development (NSSD 1) was approved by the Cabinet on 23 November 2011. The NSSD 1 builds upon the 2008 National Framework for Sustainable Development and other initiatives launched by different sectors (business sectors, government, NGO's, civil society and academia) and key role players in addressing issues of sustainability in South Africa. According to the NSSD 1, sustainability implies the continuous and mutually compatible integration of economic system and the socio-political system and the ecosystem over time. Sustainability means making sure that these systems remain mutually compatible as the key development challenges are met through specific actions and interventions to eradicate poverty and severe inequalities. The NSSD 1 was set to be implemented during period 2011- 2014. The lessons and evaluation of progress regarding the implementation of NSSD 1 will inform NSSD 2 (2015 – 2020).

The following five strategic objectives are identified in the NSSD 1:

1. Enhancing systems for integrated planning and implementation
2. Sustaining our ecosystems and using natural resources efficiently
3. Towards a green economy
4. Building sustainable communities
5. Responding effectively to climate change

The goals, interventions and indicators for each priority have been identified. Although these strategic priorities have been set on a national level, they still need to be downscaled to the provincial and local level since they are all relevant and can be applicable.

Furthermore, the strategy invites all role players to engage in an on-going and constructive dialogue. This will be inspired by the need to develop a more efficient and equitable economy. It is critical that all role players implement the strategy initiatives and that collective actions make a significant contribution to environmental sustainability.

4.5 KwaZulu-Natal Provincial Growth and Development Strategy (2016)

The first Provincial Growth and Development Strategy (PGDS) was developed in 2011. It aims at ensuring that growth and development of the KwaZulu-Natal Province will at all times be guided and directed by a

long term Vision and Strategy. It is for this reason that a 20-year vision was adopted in moving KZN towards 2030. With the 2011 PGDS now having been in implementation for the last 5 years and 25% of the vision period having passed, it is essential to undertake a strategic review so as to reconfirm or adjust the Vision and related strategies. At the same time it is now necessary to maintain a 20 year rolling Vision for the Province and, therefore, to extrapolate Vision 2030 to Vision 2035. The vision for the Province is that by 2035, "KwaZulu-Natal will be a prosperous Province with a healthy, secure and skilled population, living in dignity and harmony, and acting as gateway to Africa and the World".

In order to realize the 2035 vision, seven long-term goals have been identified to guide policy-making, programme prioritization and resource allocation.

Table 3: PGDS Strategic Goals and Objectives

STRATEGIC GOAL	No	STRATEGIC OBJECTIVE 2016
1 INCLUSIVE ECONOMIC GROWTH	1.1	Develop and promote the agricultural potential of KZN
	1.2	Enhance sectoral development through trade investment and business retention
	1.3	Enhance spatial economic development
	1.4	Improve the efficiency, innovation and variety of government-led job creation programmes
	1.5	Promote SMME and entrepreneurial development
	1.6	Enhance the Knowledge Economy
2 HUMAN RESOURCE DEVELOPMENT	2.1	Improve early childhood development, primary and secondary education
	2.2	Support skills development to economic growth
	2.3	Enhance youth and adult skills development and life-long learning
3 HUMAN AND COMMUNITY DEVELOPMENT	3.1	Eradicate poverty and improve social welfare services
	3.2	Enhance health of communities and citizens
	3.3	Safeguard and enhance sustainable livelihoods and food security
	3.4	Promote sustainable human settlements
	3.5	Enhance safety and security
	3.6	Advance social cohesion and social capital
	3.7	Promote youth, gender and disability advocacy and the advancement of women
4.INFRASTRUCTURE DEVELOPMENT	4.1	Development of seaports and airports
	4.2	Develop road and rail networks
	4.3	Develop ICT infrastructure
	4.4	Ensure availability and sustainable management of water and

		sanitation for all
	4.5	Ensure access to affordable, reliable, sustainable and modern energy for all
	4.6	Enhance KZN waste management capacity
5 ENVIRONMENTAL SUSTAINABILITY	5.1	Enhance resilience of ecosystem services
	5.2	Expand the application of green technologies
	5.3	Adapt and respond climate change
6 GOVERNANCE AND POLICY	6.1	Strengthen policy, strategy coordination and IGR
	6.2	Build government capacity
	6.3	Eradicate fraud and corruption
	6.4	Promote participative, facilitative and accountable governance
7 SPATIAL EQUITY	7.1	Enhance the resilience of new and existing cities, towns and rural nodes, ensuring equitable access to resources, social and economic opportunities
	7.2	Ensure integrated land management use across the Province, ensuring equitable access to goods and services, attracting social and financial investment

Source: KZN PGDS (2016)

5. Biophysical Environment

5.1 Topography

Ulundi demonstrates a steep topography with an elevation of 1600m above the sea level in the western part, 723m above the sea level within the central part and 140m above the sea level within the eastern part of boundary of the municipality (Ulundi, 2020). The White Mfolozi River further divides of the western mountainous area of the municipality into a northern and southern area, with only four official crossing points situated on the R66, the R34 (including a smaller bridge next to R34 crossing) and a crossing where the L1606 connects Mpungamhlope to the P734 and Lottery. The terrain is rugged, however with most settlement located in evenly sloped areas (Ulundi 2016).

5.2 Slope Analysis

The slope analysis depicts the gradients of the land as it declines in height above sea level towards the east. The slope categories range from smaller than 1:10 (10% incline), 1:6 (17% incline) and 1:3 (33%

incline) and steeper. The greater the gradient (1:6 – 1:3), the more difficult and more expensive construction and provision of services become.

Slope is also affecting modes of transport, as a maximum gradient of 1:20 (5%) is recommended for bicycle tracks, and a maximum gradient of 1:12 (8%) is recommended for footpaths. The terrain therefore plays an integral part in determining settlement patterns or the line of roads, which needs to be built cost-effectively.

The slope analysis map indicates that the mentioned slope variants are evenly distributed throughout the municipal area, with most settlements located within the more evenly sloped areas.

5.3 Geology

According to the Zululand DM EMF (2019), the geology and soils occurring at uLundi local municipal area can be summarised as follows:

- The Eastern portion is underlain by Polassic granite, gneiss Group and Shale with thin sitstones and sandstones in the uppermost part.
- The central portion is underlain by Lavas, quartzites and Diamacite with varved shale, mudstone with dropstones and fluvioglacial graval, and the western fine-to-coarse-grained sandstone, shale, coal seams.

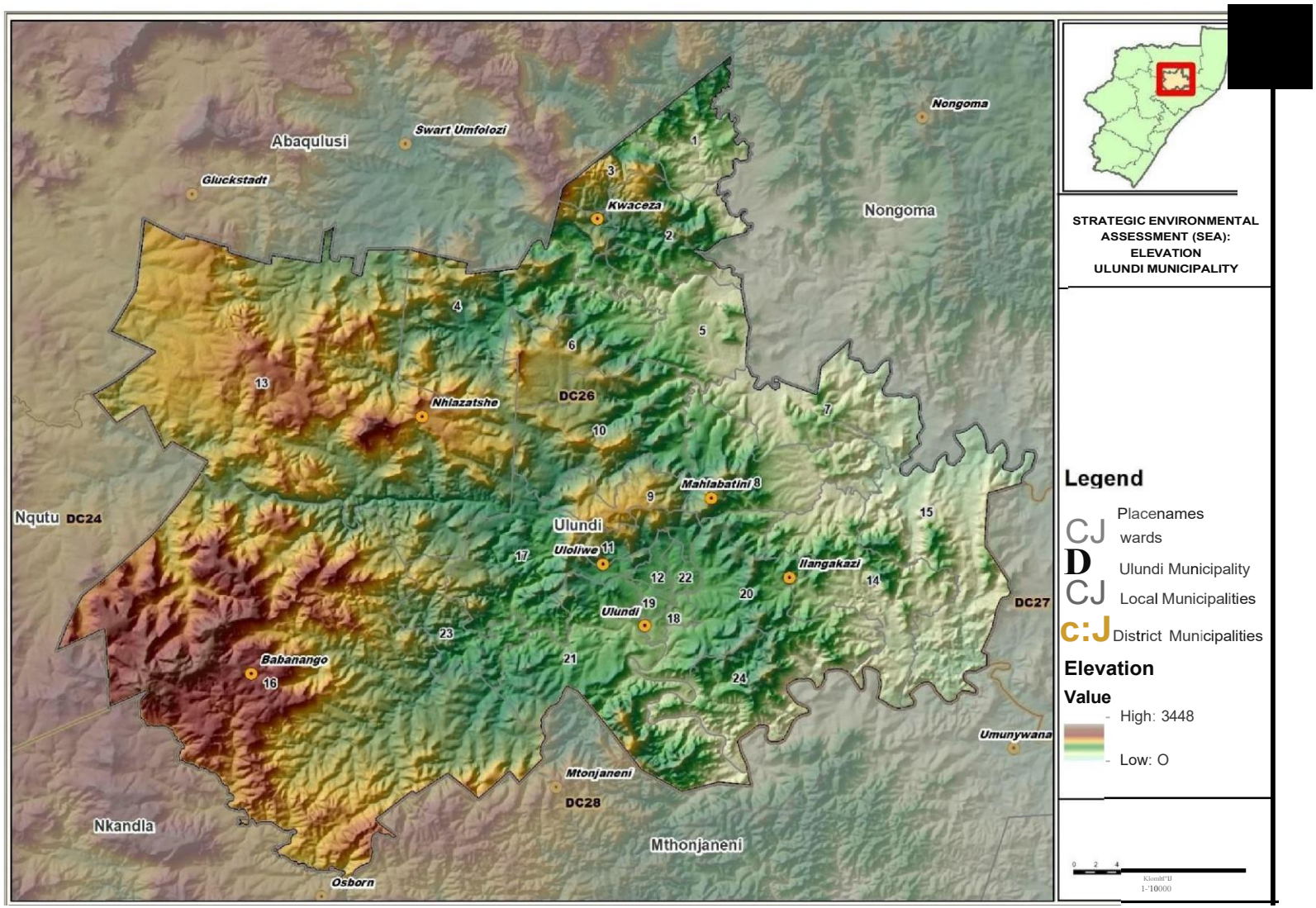


Figure 4: Topography

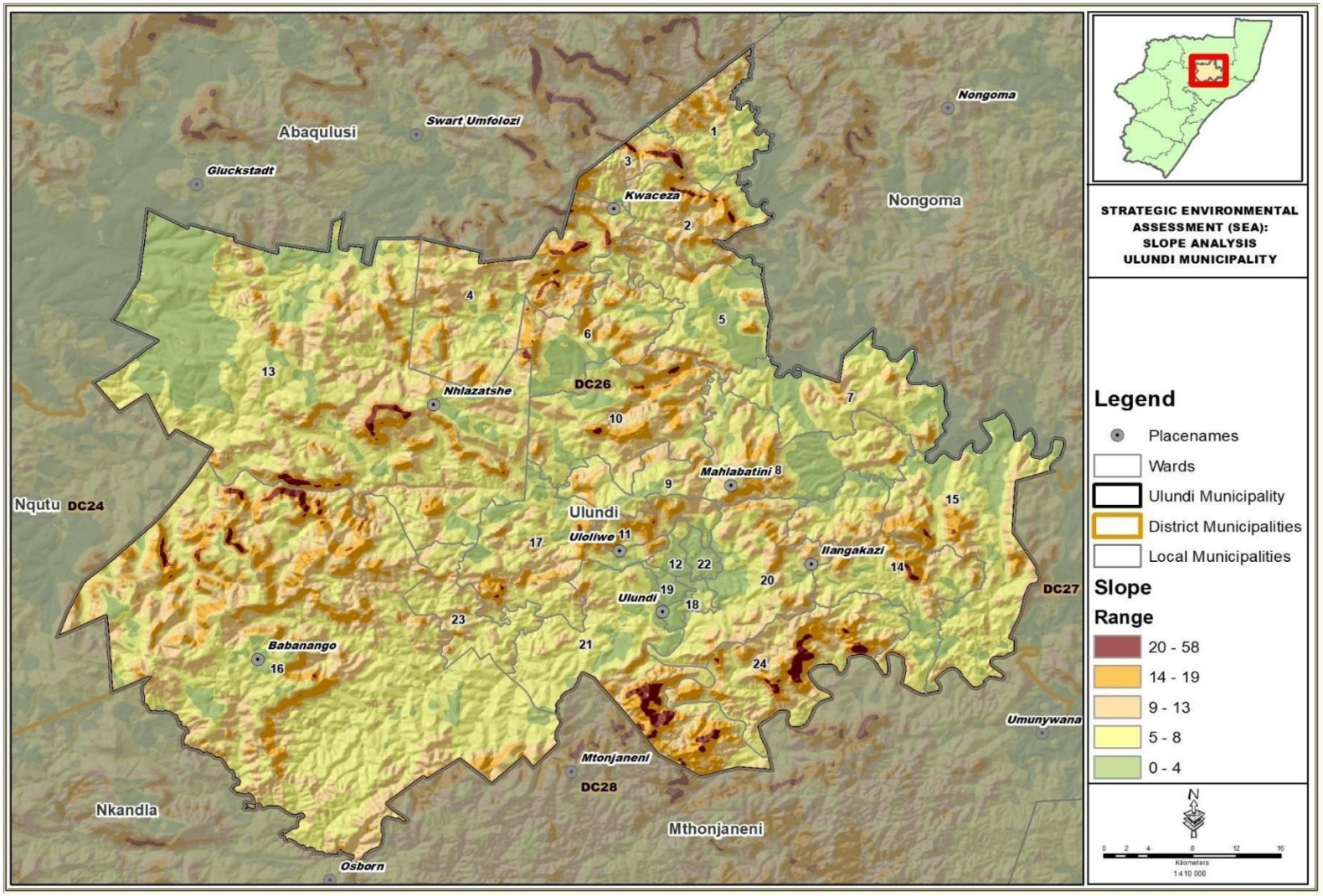


Figure 5: Slope Analysis

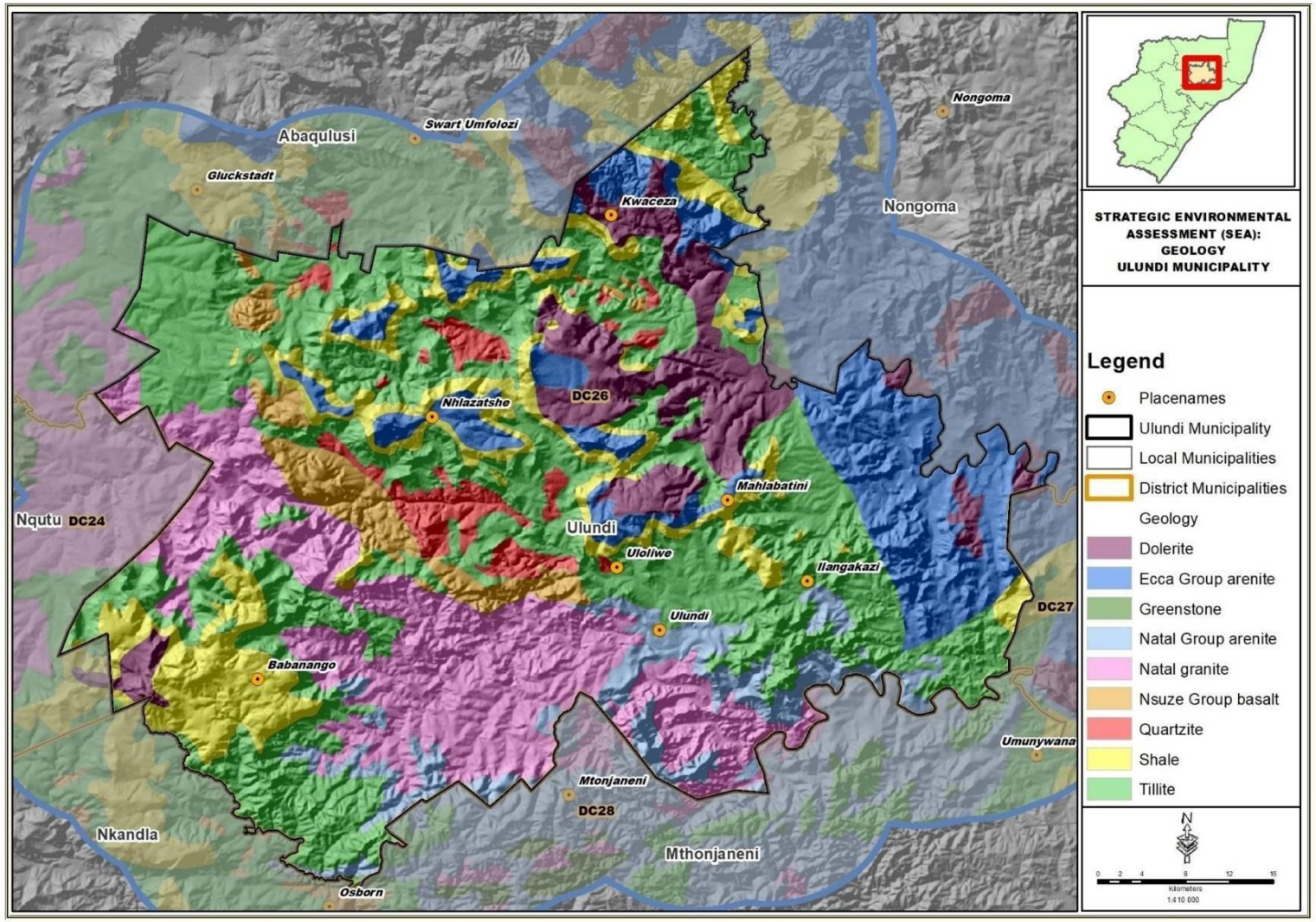


Figure 6: Geology

5.4 Climate

5.4.1 Evaporation and Precipitation

The Ulundi Municipality has a mixture of two "precipitation sectors" which is linked to the varying topography within the Municipal area. On average the two sectors average between 722 to 826mm per annum and 827 to 912mm per annum. Selected pockets have a higher average precipitation of 1,012 to 1,251mm per annum (Ulundi LM, 2016). Average evaporation is linked to height above sea level, which also affects other meteorological conditions such as wind occurrences. The low-lying areas of the Municipality has an average of 1801 to 2000mm per annum evaporation rate, whilst the higher lying areas averages 1601 to 1800 mm per annum (Ulundi LM, 2020).

5.4.2 Climate Change Impacts on Rainfall and Temperature

The Long-Term Adaptation Scenarios Flagship Research Programme (LTAS) forecasts that in the future change is also predicted to increase temperatures and rainfall variability as well as decrease water security, which will negatively affect the quantity of agricultural production in the District Municipal Area. These effects are expected to raise the frequency and severity of floods, droughts and fires in South Africa, resulting not only in agricultural losses but also in impacts to most other sectors of the local economy as well. By decreasing agricultural yields, climate change could impact commercial agriculture by reducing profitability and job opportunities in the sector. There is also concern that subsistence farmers and their dependents are vulnerable to the predicted effects of climate change such as the effect of increased rainfall variability on food production and food security. This is especially important given the high level of subsistence agriculture in the Zululand District Municipal Area. Subsistence farmers struggle to adapt to the predicted impacts of climate change because they tend to lack access to information and the necessary resources to adapt.

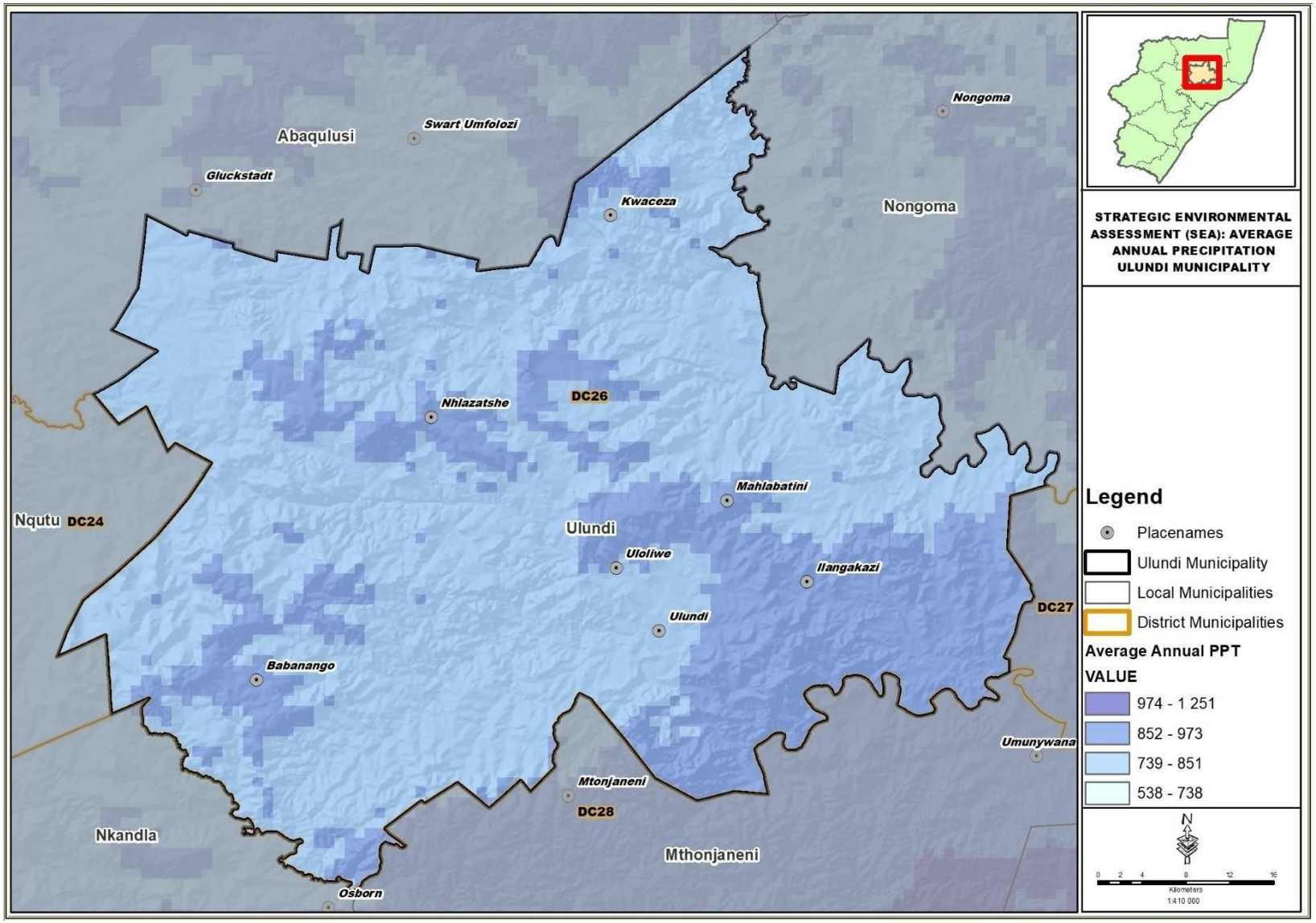


Figure 7: Average Annual Precipitation

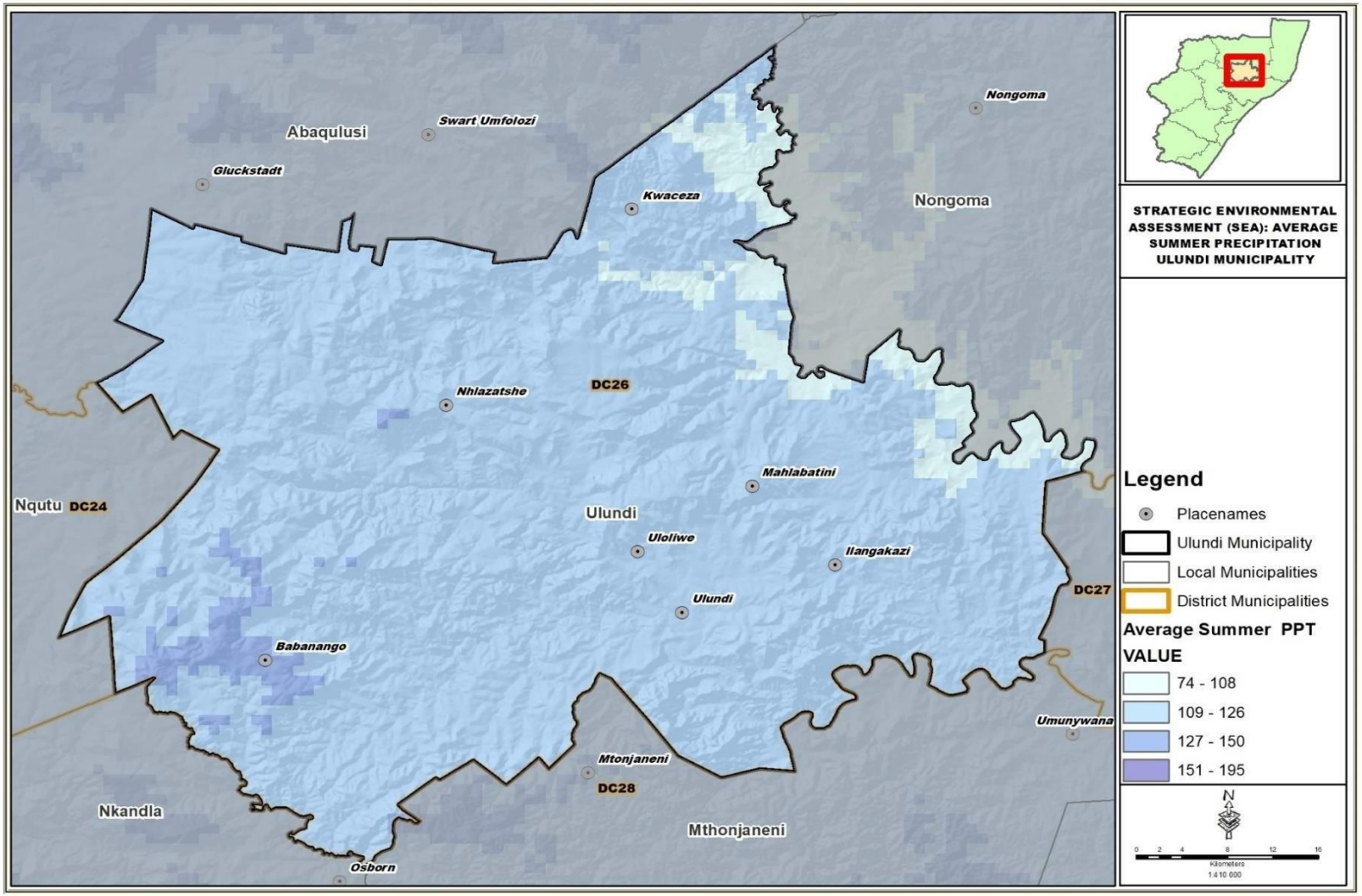


Figure 8: Average Summer Precipitation

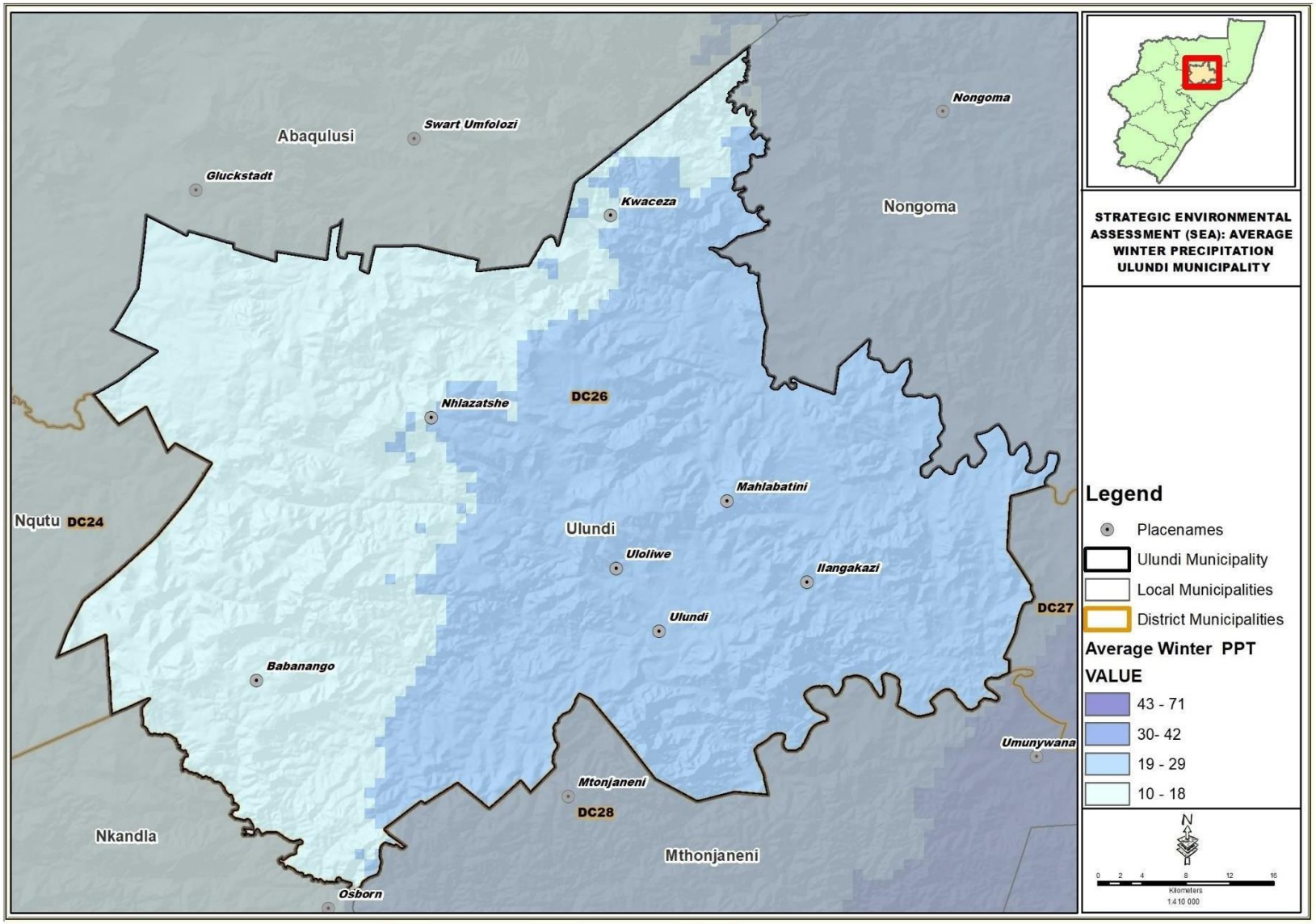


Figure 9: Average Winter Precipitation

5.5 Hydrological Assessment

5.5.1 Water availability

The quantity of water flowing in a river and the periods over which different volumes flow in a river are major factors determining ecological condition of a river. Naturally, flow variation is dictated largely by rainfall, whether through stormflow or interflow and groundwater contributions to baseflow, which sustains stream flow during dry conditions. River ecosystems have been shaped due to the natural cycles of high and low flow, floods and droughts and they depend on this variable pattern of flow to maintain habitat, biological diversity and ecological functioning. The quantity of water available for direct human use or to support aquatic ecosystems depends on the availability and sustainability of the resource. Rainfall, surface flows and groundwater recharge are intimately linked in the hydrological cycle and need to be managed in an integrated way.

There are two catchment runoff monitoring stations located within ULM, namely; Ulundi Weir (W2R002) and Overvloed (W2H005). However, station W2R002 does not have flow records, thus leaving station W2H005 the only actively monitored surface runoff station within ULM. Other surface water flow monitoring stations are located outside ULM, as shown in Figure 1-6 below.

The White uMfolozi catchment at W2H005 station command area covers an area of approximately 3939 km^2 and runoff has been monitored continuously since October 1960. The catchment's monthly runoff is represented by the stream hydrograph. The streamflow hydrograph is commonly conceptualised to include baseflow and a runoff component. The baseflow represents the relative steady contribution to stream discharge from groundwater, while runoff represents the streamflow contributed by shallow subsurface flow and direct surface runoff. The White uMfolozi catchment runoff data shows well-identified seasonal fluctuations. As expected, peak flows occur in summer rainy season and low flows occur during the dry winter season. Peak flows tend to occur in summer months (December-February); whereas, low flows tend to occur in winter months between June or July. The catchment recorded a mean monthly runoff of 21.03 million m^3 and a mean annual runoff (MAR) of 247.80 m^3. The minimum monthly flow recorded is 0.016 million m^3 which occurred in May 2017. This is expected as the entire KwaZulu-Natal province experienced heavy drought during the years 2014 to 2017. The maximum recorded monthly runoff is 492 million m3 which occurred in July 1963.

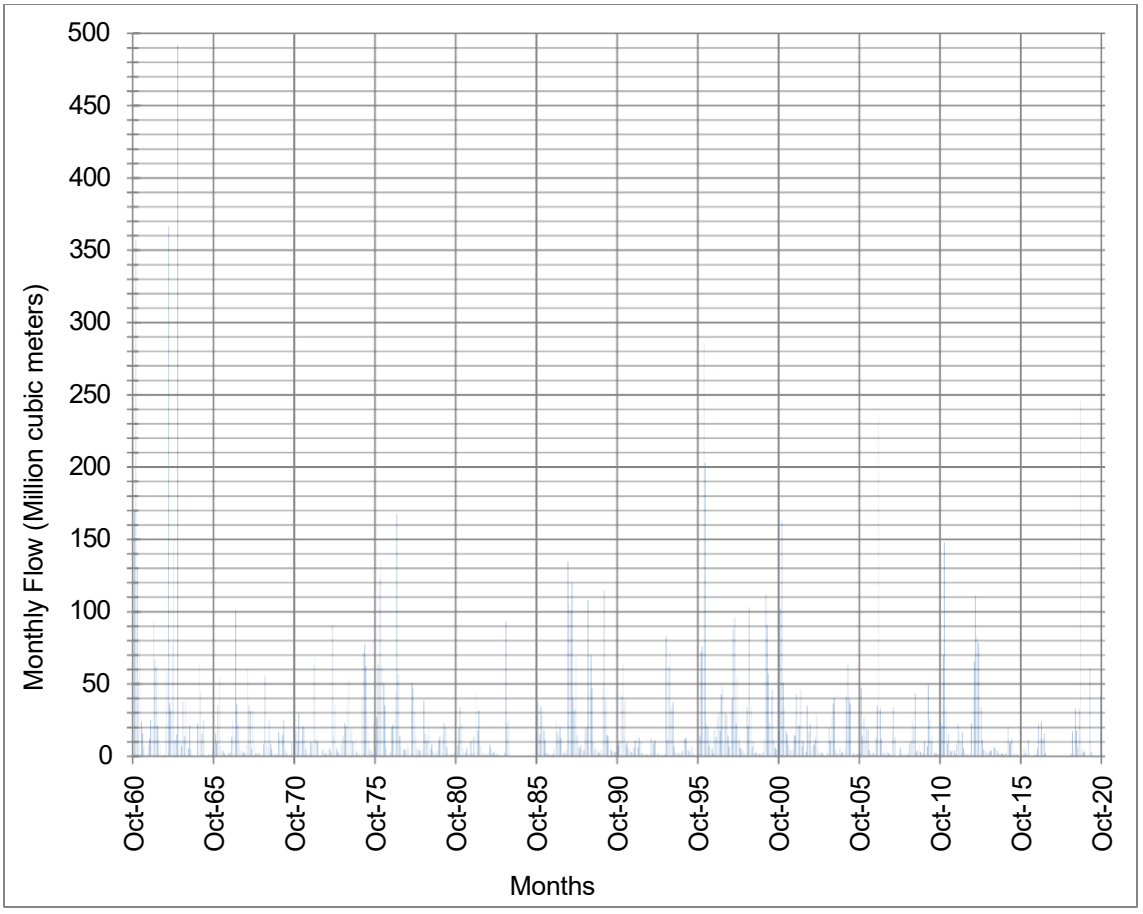


Figure 10: Mean monthly runoff of White uMfolozi catchment (WH2005)

5.5.2 Water use

The total surface water resources of the White Mfolozi system are estimated at 38 million m^3/annum, including an adjustment for stream flow reduction activities. However, return flows are limited and are estimated to be 4.7 million m^3/annum (EKZNW, 2015). Water resources within the White uMfolozi catchment are mostly undeveloped with the most significant being the Klipfontein Dam in the upper reaches. This dam has a capacity of 19 million m^3 and was constructed to augment water supply to the towns of Vryheid and Ulundi. Provision was also made for irrigation requirements. The White Mfolozi catchment consists mostly of commercial farming in the northwest and Traditional Council land in the southeast, with the main activity being cattle farming. According to EKZNW (2015), approximately 120 km^2 of commercial forestry (or 2.5% of the land cover) and 30 km^2 of alien vegetation (less than 1% of the land cover) are situated in the upper reaches of the catchment. Only a small portion of the catchment area is irrigated, estimated at about 8 km^2, downstream of Klipfontein Dam. Some farmers have reduced their irrigation requirements because of the high cost of water.

Ulundi town receives water from an abstraction weir on the White uMfolozi River with yields supplemented with releases from the Klipfontein Dam during low flows. However, losses between Klipfontein Dam and the Ulundi weir are large and this method of operation is not efficient (EKZN, 2015). A significant amount of water is transferred out of the lower White Mfolozi, just before it flows into the sea to the Mhlathuze catchments for mining use by Richards Bay Minerals. There is a deficit in the lower White Mfolozi during the winter months. This deficit can possibly be overcome by releases from Klipfontein Dam. However, analyses indicate that when the rural water demand increases then there would be a shortfall in supply from Klipfontein Dam (EKZN, 2015). This may be resolved by either provision of off channel storage at Ulundi or the reallocation of irrigation water use. Most surface water used for domestic water supply within ULM is from rivers, however a number of boreholes are used to supplement river water supply, especially in rural areas of the municipality. Table 2 shows surface water utilisation within ULM

Table 4: Utilization of surface water resources within Ulundi local municipality).

Scheme Name	Settlement Type	Function	Water Source	Resource Type
Ulundi	Urban	Water and Sanitation	Ulundi WTW	White uMfolozi River weir
KwaCeza Hospital	Rural	Water and Sanitation	KwaCeza WTW	River weir
Emakhosini	Rural	Water	Emakhosini WTW	River weir
Mahlabathini	Rural	Water and Sanitation	Unkown	Unknown
Mpungamhlophe / Denny / Dalton	Rural	Water and Sanitation	Mpungamhlophe WTW	River weir
Nondayana	Rural	Water	Package plant	Unknown
Thulasizwe Hospital	Rural	Water and Sanitation	Thulasizwe WTW	River weir

Source: Modified from ZDM (2004)

5.5.3 Surface water quality

Water quality is a term used to describe the chemical, physical, and biological characteristics of water in respect to its suitability for an intended use. South Africa is faced with water quality challenges which are mainly induced by human activities, rendering most water resources unfit for intended use.

However, it is also important to note that there are water quality challenges that result from natural causes, such as weathering of rocks, leaching from soil as well as biological process within the aquatic environment. Anthropogenic problems are usually associated with industries that produce chemical waste, mines that introduce metals, wastewater treatment works that discharge poorly treated effluents introducing excessive nutrients, phosphates and coliforms and agriculture which use pesticides, herbicides and fertilizers introducing salts and other toxic substances into water. The National Water Act, (Act No. 36 of 1998) requires that no development makes a discharge into a water resource that will significant negatively affect its water quality. Similarly water quality limits have been established to control discharges to rivers. The cumulative impacts of multiple discharges, illegal waste dumps, poor governance and management of sewer and stormwater systems creates significant water quality issues in many municipalities.

The National Water Act requires the Minister of Water Affairs to establish a national monitoring system for the collection of appropriate data and information that is adequate and responsive to the present and future challenges of efficient management of the country's water resources (NWA, 1998). Generally, the National Department of Water and Sanitation (DWS) undertakes water quality monitoring at various designated water monitoring points as part of its National Water Quality Monitoring Programme (NWQMP), National Microbial Monitoring Programme (NMMP) and National Ecosystem Health Monitoring Programme (NEHMP). However, DWS is yet to implement such water quality monitoring programmes for catchments within ULM.

At present, water quality monitoring programmes being actively monitored in rivers within ULM relates to the monitoring of specific aspects that relate to water use authorisations, such as discharges from wastewater treatment works (Table 4). A further limitation is the inconsistency in the monitoring frequency, availability of water quality monitoring data as well as the spatial representation of these water discharge monitoring points. This is reported to be mainly due to the lack of capacity to undertake water quality sampling in rivers, coupled with the challenges related to the management of water quality monitoring systems and databases.

Table 5: Wastewater treatment works (WWTW) and wastewater discharge monitoring points within Ulundi LM.

Name of WWTW	Monitoring point name	Point Source Discharge or Water Resource	Water Resource name
James Nxumalo Oxidation Ponds	Ulundi James Nxumalo Agricultural High School - @ Final Discharge from Oxidation Pond to White-Mfolozi	Point Source Discharge	White Umfolozi
James Nxumalo Oxidation Ponds	White Umfolozi River downstream of James Nxumalo Oxidations Ponds	Water Resource	White Umfolozi
Ulundi WWTW	Ulundi - @ Final Discharge from Ulundi WWTW to White-Umfolozi River	Point Source Discharge	White Umfolozi
St Francis Hospital WWTW	St Francis Ponds Final Discharge after chlorination at the Transfer Feature	Point Source Discharge	White Umfolozi
Nkonjeni WWTW	Nkonjeni - @Final Discharge from Nkonjeni Ponds to Nqabeni (Kwagwabini	Point Source Discharge	Nqabeni River
Nkonjeni Oxidation Ponds	Nkonjeni - Upstream of Nkonjeni Ponds on Nqabeni (Kwagwabini) River	Water Resource	Nqabeni River
Nkonjeni Oxidation Ponds	Nkonjeni - Downstream of Nkonjeni Ponds on Nqabeni (Kwagwabini) River	Water Resource	Nqabeni River

The water quality in rivers within the Zululand District municipal area is generally in a good state (ZDM, 2019). However, rapid population growth and urbanisation have resulted into unplanned densification of areas that have impacted on the municipality's service capacity. Sewerage capacity in certain areas is insufficient and residents lack understanding of these systems resulting in the need for extensive maintenance. The lack of solid waste removal in certain areas together with aging wastewater infrastructure threatens ecosystem integrity and human health. This is most likely to contribute significantly to the decline of water quality and river health in ULM. The transformation and degradation

of wetlands through infilling, inappropriate construction of infrastructure and inappropriate land use management such as cultivation, overgrazing and alien plant infestation impact on the wetland system's ability to provide goods and services, thus impacting on water quality and quantity. Land transformation and degradation affects natural flood regimes and an increase in the size of flood areas which impacts on existing development, limits land available for development and increases human vulnerability.

Localised issues that result in poor water quality in rivers within ULM can be summarised as follows:

- Illegal dumping of waste
- Inadequate sewage infrastructure, maintenance and poor operation of wastewater treatment works;
- Stormwater ingress into the sewerage system leading to surcharging sewer lines and overloading of wastewater treatment works;
- Lack of sanitation services and overflow of on-site sanitation systems;
- Proximity of settlements to water resources (wetlands, watercourse, etc.);
- Illegal cultivation of agricultural crops in wetlands and watercourse areas;
- Agriculture and livestock pressures that cause deterioration of upslope and riparian areas as well as the input of nutrients to surface water.
- Urbanization and other developments resulting in increased impervious surfaces and increased storm water runoff and flood response times;
- Alien plant invasion and an overall loss of riparian integrity, mostly as a consequence of impacting activities and developments within riparian zones;
- Illegal sand mining activities.

5.5.4 Water Bodies and Catchment Areas

Catchments are the areas of land where rainwater drains downhill into a body of water, such as a river, lake or dam. The drainage basin includes both the streams and rivers that convey the water as well as the land surfaces from which water drains into those channels and is separated from adjacent basins by a catchment divide. Ecological aspects need to be taken into account when considering Catchment Areas/Drainage Basins. Water that is accumulated within the catchment areas, flows to water bodies namely rivers and dams which is ultimately utilised to provide potable water for household purposes.

Ulundi LM is situated within the Umfolozi secondary catchment (W2) which forms part of Pongola to Mtavuna water management area**.** The White Mfolozi catchment consists mostly of commercial farming

in the northwest and Traditional Council land in the southeast, with the main activity being cattle farming. Water resources within the catchments are mostly undeveloped with the most significant being the Klipfontein Dam in the upper reaches. This dam has a capacity of 19 million m^3 and was constructed to augment water supply to the towns of Vryheid and Ulundi. Ulundi receives water from an abstraction weir on the White Mfolozi River. River yields are supplemented during low flows with releases from the Klipfontein Dam, which is underutilized and has capacity. However, losses between Klipfontein Dam and the Ulundi weir are large and this method of operation is not efficient (Ezemvelo KZN Wildlife, 2015).

A significant amount of water is transferred out of the lower White Mfolozi, just before it flows into the sea, to the Mhlathuze catchments for mining use by Richards Bay Minerals. There is a deficit in the lower White Mfolozi during the winter months. This deficit can possibly be overcome by releases from Klipfontein Dam. However the analyses indicates that when the rural water demand increases to 60lcd then there is a shortfall in supply from Klipfontein Dam. This may be resolved by either provision of off channel storage at Ulundi or the reallocation of irrigation water use

Ecological aspects need to be taken into account when considering Catchment Areas/Drainage Basins. Water that is accumulated within the catchment areas, flows to water bodies namely rivers and dams which is ultimately utilised to provide potable water for household purpose

The presence of a large number of rivers and high volumes of water implies that safety of communities also needs to be considered by locating them outside possible flood areas. The highest volumes of water (111.2m^3 to 205.2m^3) are measured in the south east of the Ulundi Municipality consisting largely of the area situated between Ulundi, Dingaanstat and Nqulwane. The catchment area in ward 1 has similar volumes of water runoff. The areas directly east of Xolo, Nondlovu and Mahlabathini, as well as the areas directly south and east of Kwambambo, Makhiosini and Dingaanstat only accumulates a mean runoff of 68.04m^3. The areas north west of Dlebe and the areas south of Ngongweni has a runoff of between 0 and 17.02m^3, whilst the remainder of the municipal area has a runoff of between 17.03 and 38.58m^3 per annum.

5.6 Rivers

The White and Black uMfolozi Rivers are the main river systems of the local municipality with sources from outside ULM boundaries, approximately 18 km north-west of Vryheid and 26 km east of Vryheid respectively. The main tributaries of the Black uMfolozi River within ULM are iThaka, Vungu, Mbhekamuzi, Matiyamba and Zoma Rivers. Whereas, the main tributaries of White uMfolozi River within ULM are Mvutshini, Nhlebela, Mpathe, Nhlazatshe, Maphophoma, Mkumbane, Mthibelundi, Nkunzana, Ndlovane, Demaneni and Nhlungwane Rivers. Various other small tributaries drain into these major tributaries, which subsequently discharge into the White uMfolozi River. The White uMfolozi River flows in a west to south easterly direction and confluences with the Black uMfolozi River in the Hluhluwe-Mfolozi Park becoming the uMfolozi River and subsequently discharges into the Indian Ocean in the east, just north of Richards Bay. Figure 13 below shows river systems within Ulundi local municipality.

5.6.1 River Freshwater Ecosystem Priority Areas(FEPA)

According to Nel et al. (2011), the National FEPA maps provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas or FEPAs. The objectives of the Freshwater Ecosystem Priority Areas (FEPAs) are to:

- Identify the National Freshwater Ecosystem Priority Areas; and
- Develop an institutional basis to enable effective implementation.

The NFEPA provides guidance on how many rivers, wetlands and estuaries, and which ones should remain in natural or near natural condition. It supports:

- The water resources protection goals of the National Water Act (Act 36 of 1998);
- The National Environmental Management Act: Biodiversity Act (Act 10 of 2004) by informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act; and
- The implementation of the National Environmental Management: Protected Areas Act (Act 57 of 2003) by informing the expansion of the protected area network. River conditions as described by FEPAs are categorised as per the Table below:

5.6.2 River classification

River conditions in South Africa have been classified according to the NFEPAs for river ecosystems (SANBI, 2011). Different grades of NFEPA's classification for river ecosystems are shown in Table 5. Most of the rivers within Ulundi LM fall into either unmodified/natural category (Grade A) or largely natural (Grade B) classification categories as shown Figure 14. This suggests that most rivers within ULM are able to contribute towards river ecosystem biodiversity targets. In contrast, rivers that are categorised as 'largely modified' or worse are unable to contribute towards river ecosystems as they are not in a good state (SANBI, 2011). Human influences on rivers need to be managed to ensure that negative impact be minimalized.

Table 6: Present Ecological State Categories describing current and future desired condition of rivers in South Africa

Ecological category Description	Ecological category Description
A	Unmodified, natural
B	B Largely natural with few modifications. A small change in natural habitat and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions have occurred
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions are extensive.
F	Critically/Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and changes are irreversible.

Source: Driver et al. (2011)

Driver et al., (2011) defines free flowing rivers as those are rivers without dams. These rivers flow undisturbed from their source to the confluence with a larger river or to the sea. Dams prevent water from flowing down a river and disrupt ecological functioning with serious knock-on effects for downstream river reaches and users. Where such a river must be permanent or seasonal flowing and have an 'A or B' ecological category (good condition), with inland rivers have a minimum length of 50km. According to Drivers et al. (2011), free flowing rivers are rare in South Africa and they form part of our natural heritage

It is worth noting that the flagship free-flowing rivers were identified based on their representativeness of free-flowing rivers across South Africa, as well as their importance for ecosystem processes and biodiversity value. These flagship free-flowing rivers should receive top priority for retaining their free-flowing character (Driver et al., 2011).

In Ulundi LM, there is one free flowing river, Black Umfolozi River. At a national level, there are 62 free flowing rivers and only 25 are longer than 100 km. Nineteen of the 62 rivers have been identified through the National FEPAs flagship projects. Four of the 19 flagship free flowing rivers identified at national level, they are located in KZN and Black uMfolosi River which is found within Ulundi LM is one of the 4 flagship free flowing rivers identified in KZN (Nel et al., 2011

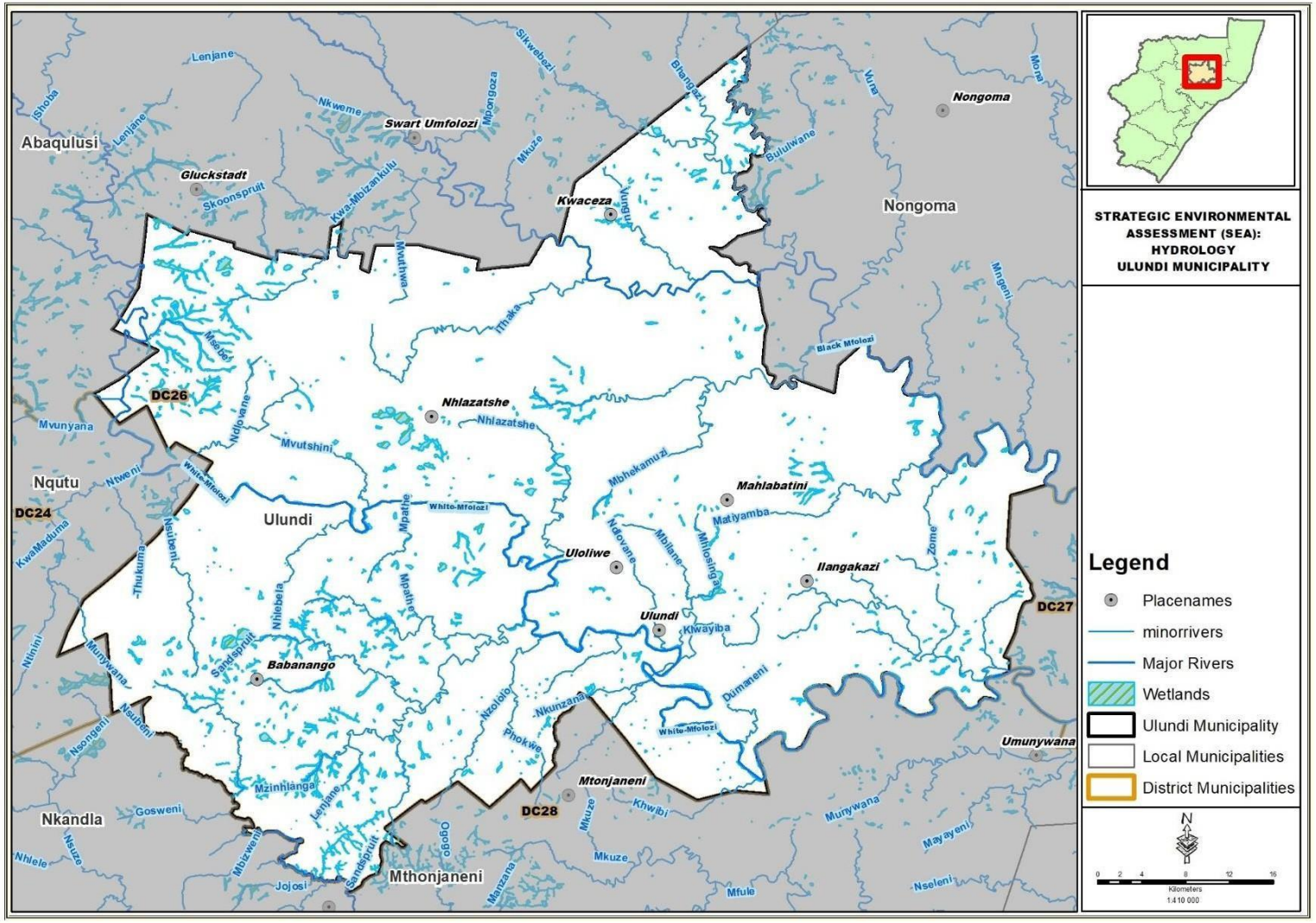


Figure 11: Hydrology

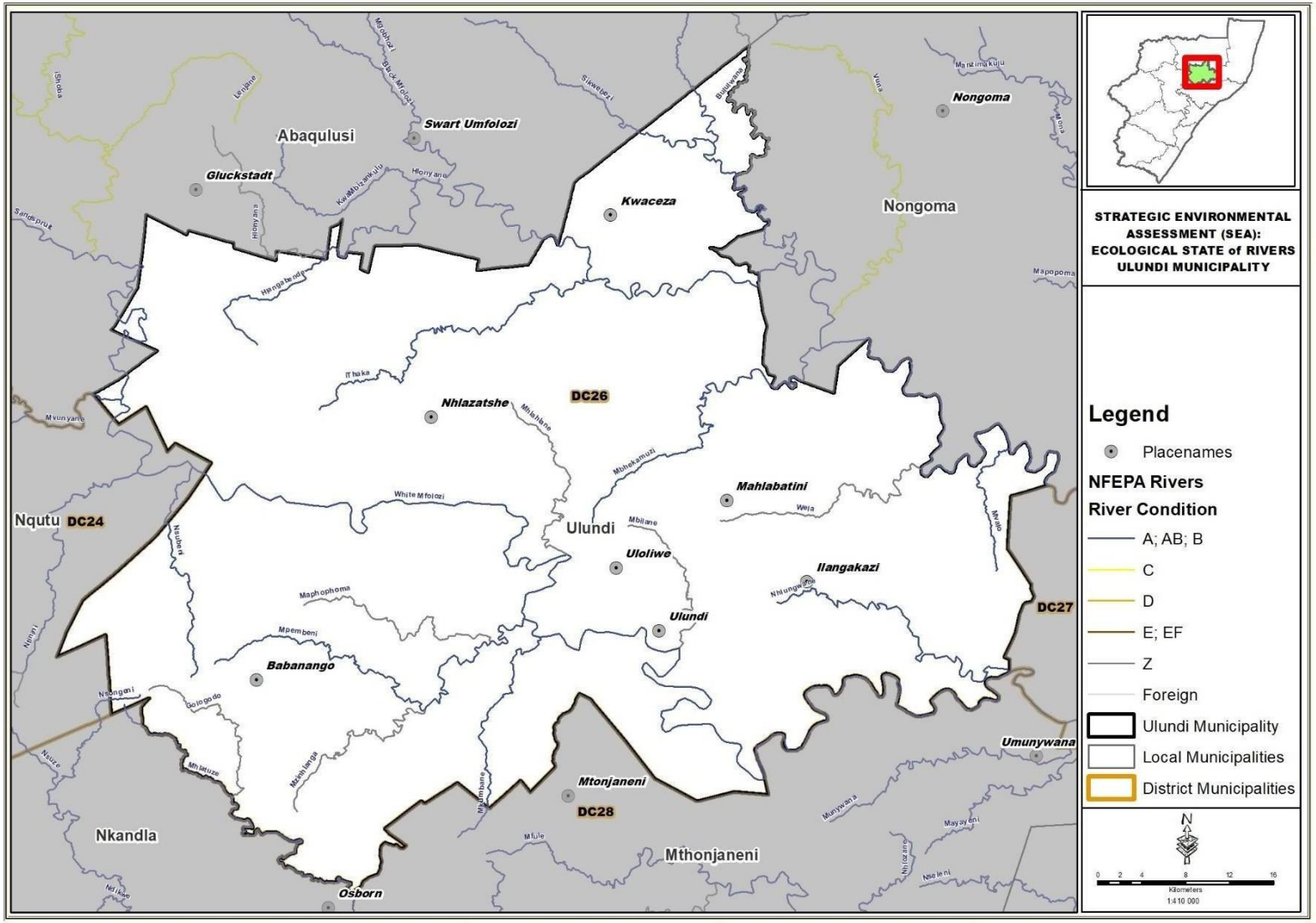


Figure 12: Ecological State of Rivers

5.6.3 Wetlands

The National Water Act (Act No. 36 of 1998) defines a wetland as the land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land that is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. The Practical field Procedure for Identification and Delineation of Wetlands and Riparian Areas (DWAF, 2006) identifies four important indicators to define wetland characteristics and boundaries in the field as shown in Figure 15, namely:

- Wetland (Hydromorphic) soils: that display characteristics resulting from prolonged saturation.
- Vegetation: the presence at least occasionally of water loving plants (hydrophytes) associated with frequently saturated soils.
- High water table: results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil.
- Terrain unit indicator: identify parts of the landscape where wetlands are more likely to occur.

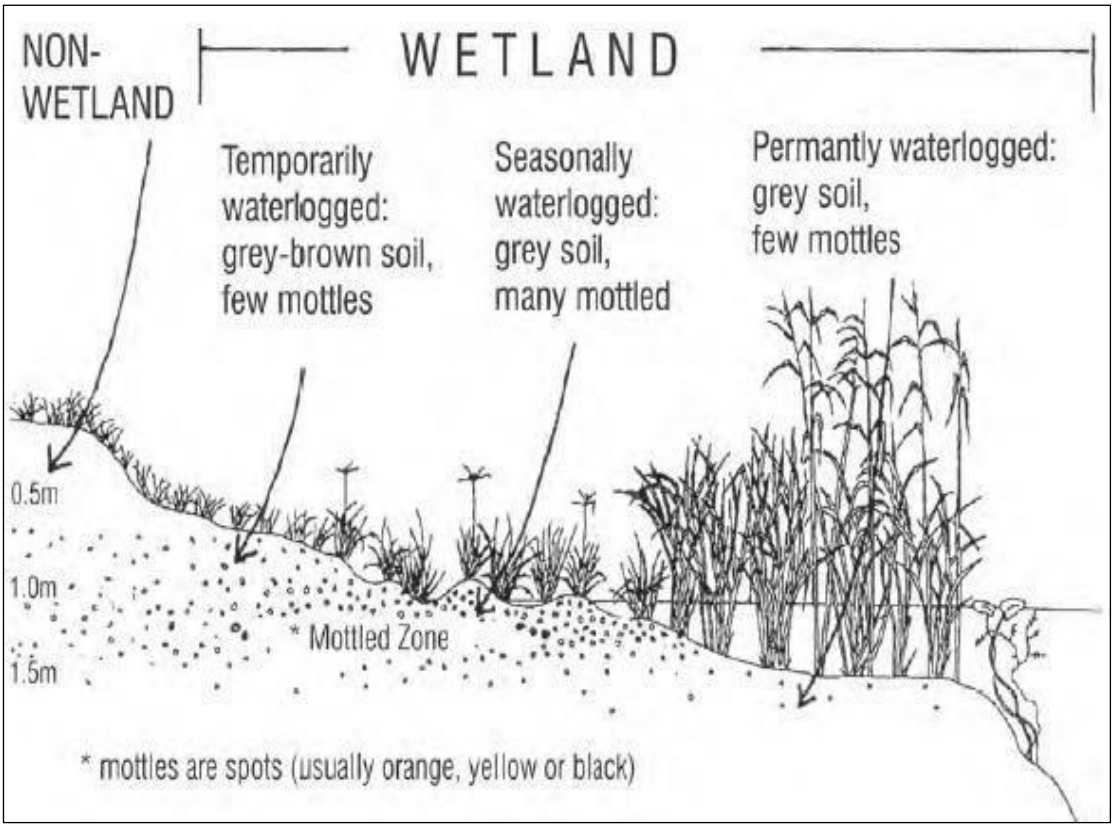


Figure 13. Cross section through a wetland, indicating soil wetness and vegetation change along the gradient of decreasing wetness.

Wetlands are extremely valuable natural resources, with high environmental, economic, aesthetic, spiritual, cultural and recreational value. Wetlands provide significant habitat to biota, as well as essential livelihood ecosystem goods and services to humans, such as:

- **Provision of services:** products that can be physically obtained from wetlands, such as freshwater, food and natural medicines.
- **Regulatory services:** benefits received from wetlands such as streamflow regulation, erosion control, water filtration and flood attenuation.
- **Cultural services:** non-material benefits that may be obtained from wetlands such as spiritual enrichment.
- **Support services:** services provided by wetlands that are necessary for the production of all other ecosystem services such as nutrient and water recycling.

Wetland systems within Ulundi LM are distributed in a complex manner occupying a variety of positions in the landscape across altitudinal gradients, ranging from open water bodies, vleis and marshes, down to wetlands associated with stream and river courses as shown in Figure 16.

The main pressures on wetland ecosystems in ULM that may result in the loss of ecosystem services include:

- Land development activities in rural are (cultivation, poor grazing and burnig combined with broader catchment impacts such as,
- Land development activities in urban are (disruption of freshwater flows, pollutants (WWTW, urbanruoff, runoff from illegal waste dumps) and sediment from surrounding land uses such as agriculture,
- Alien invasive plant species that consume valuable water resources and cause soil erosion which leads to flooding;
- Catchments areas are under pressure due to over-extraction of water (DRDLR, 2016), and;

In response to these pressures, the management plan for catchments areas and wetlands that would prevent or minimise development on wetlands (formal or informal) needs to be established and it must include awareness programmes to empower communities about ecosystem services provided by wetlands and wetland preservation measures.

5.6.4 Wetlands classification

According to the South African National Biodiversity Institute (SANBI) national wetland database, a few scattered National Freshwater Ecosystem Priority Areas (NFEPA) and non-NFEPA areas are present across the entire Zululand District Municipality (ZDM), as shown in Figure 1-3. The NFEPA's are strategic areas designed to illustrate the areas where rivers, wetlands and estuaries should remain healthy. There are a total of 22 NFEPA's for the entire ZDM of which the majority are classified as unmodified natural and largely natural (ZDM, 2019). However, the state of wetlands within ULM is found to be concerning, as only two of NFEPA's are present within the local municipality, which indicates the level of river and wetland degradation within ULM. Wetlands provide a substantial number of ecosystem goods and services, such as flood attenuation, natural treatment of water and a source of fish. Also noteworthy, South Africa currently has 23 wetlands of international importance, none of which fall within the Zululand District of which Ulundi local municipality forms part (ZDM, 2019).

5.6.5 Groundwater Characterisation

Groundwater has historically been given limited attention, and has not been perceived as an important water resource in South Africa. This is because it has long been managed as private water, before being declared to be a public resource under the National Water Act (Act No 36 of 1998). Although a lot has been said about a water crisis in the province of KwaZulu-Natal, particularly in the northern areas. However, the management of groundwater resources has to date failed to feature prominently in the provincial, regional and local agendas. This is mainly due to:

- Failure to recognize major groundwater related issues in municipalities;
- Lack of proper valuing and planning for groundwater;
- Lack of suitable regional development approaches/instruments;
- Lack of information and information management relating to groundwater resources management;
- Failure of groundwater supply due to the lack of sustainable management of the resource and issues related to operations and maintenance of groundwater supply infrastructure.

All these issues may be addressed through proper management of groundwater, which may involve the training of administrators in local government and water service institutions. Some groundwater schemes in ULM have been relatively poorly managed in the past. The major reason has been the lack of structured approach to management, and a lack of knowledge and information about groundwater. Management is often focused on the long-term sustainability of the resource in terms of quantity or

yield, whereas water quality is often neglected in many areas where groundwater is the sole source of water supply. The National Groundwater Strategy (DWA, 2016) is available to guide the use and protection of groundwater resources in South Africa. Proper operation, maintenance and management plans need to be developed and implemented for the municipality to ensure sustainable use of its groundwater resources.

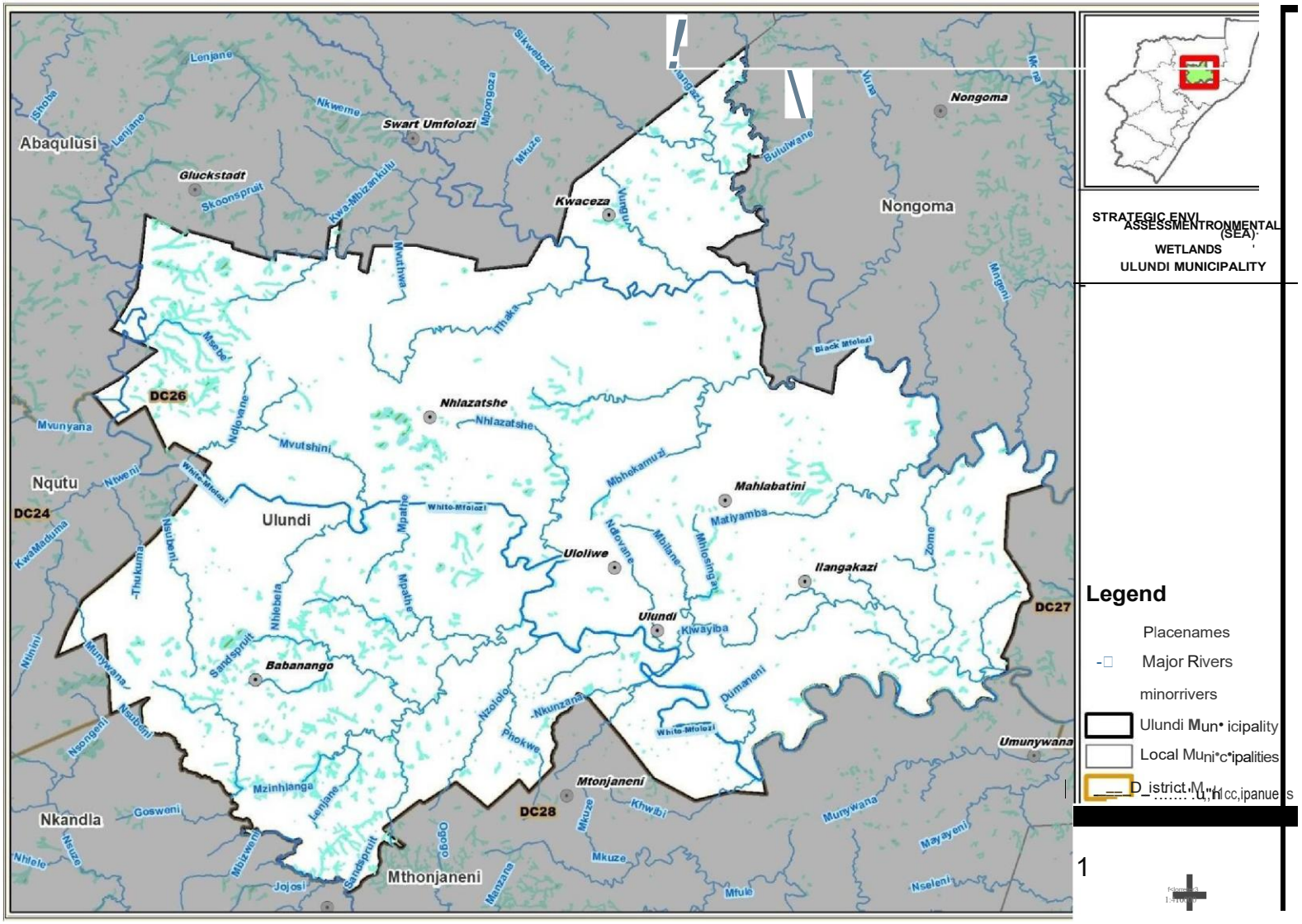


Figure 14: Wetland

5.6.6 Groundwater occurrence

Groundwater occurs in porous geological material, hence the geology of the aquifer material has an important bearing on groundwater occurrence. ULM is underlain by ancient basement granite rocks of the Natal Metamorphic Province. The Natal Group Sandstone is largely absent, apart from isolated areas. Overlying the basement rocks are the Karoo Supergroup rocks consisting of Dwyka and Ecca Groups. The Dwyka Group comprises of diamictite rocks, while the Ecca Group comprises of shale and sandstone rocks of the Vryheid formation (CGS, 1992)). Dolerite intrusions in the form of dykes and sills are common in the area. The formations making up the Karoo Supergroup rocks are often relatively massive such that primary storage and permeability is negligible. Groundwater storage and movement is confined to joints and bedding planes within the rock mass that yield between 0.5 and 2 l/s. In the absence of faulting or dolerite intrusions, the groundwater potential of these sediments is marginal to poor ranging from 0 to 0.5 l/s. The indurated contact zones in sediments adjacent to the intrusive Jurassic age dolerite intrusions are often highly fractured and these discrete zones enhance groundwater storage and rock mass permeability. As a result, boreholes drilled to intersect these structures usually produce higher yields than that of the surrounding host rock. These contact zones usually produce yields ranging from 0.1 – 10 l/s.

According to the South African Aquifer Classification System (DWA, 2012) shown in Figure 1-10, ULM falls within minor aquifer region classified as moderate yielding aquifer system of variable water quality mode of groundwater occurrence associated with fractures, fissures and joints. According to DWA, 2012, the borehole yields within ULM are ranging from poor to moderate varying between 0.5 and 2 liters per second, with hydraulic conductivities ranging between 0.4 and 7.7 m/day. The recommended good borehole yields for sustainable water use is between 2 -5 liters of water per second.

Faults, fractures, joints and dykes play a primary role in the storage and transmission of groundwater. Therefore, moderate to good yields can be realized along these major structures. The depth to static groundwater level in ULM infrequently it does exceeds 20 m. Although rest groundwater level elevations theoretically represent a piezometric surface due to the semi-confined nature of groundwater occurrence in the region, groundwater drainage patterns in the area ostensibly mimic that of surface topography. Groundwater recharge as estimated by Van Wyk (1963) in respect of the Vryheid formation is between 4-5 % of mean annual precipitation (MAP) and occurs as surface water infiltrates the soil especially through exposed fractures and weathered zones.

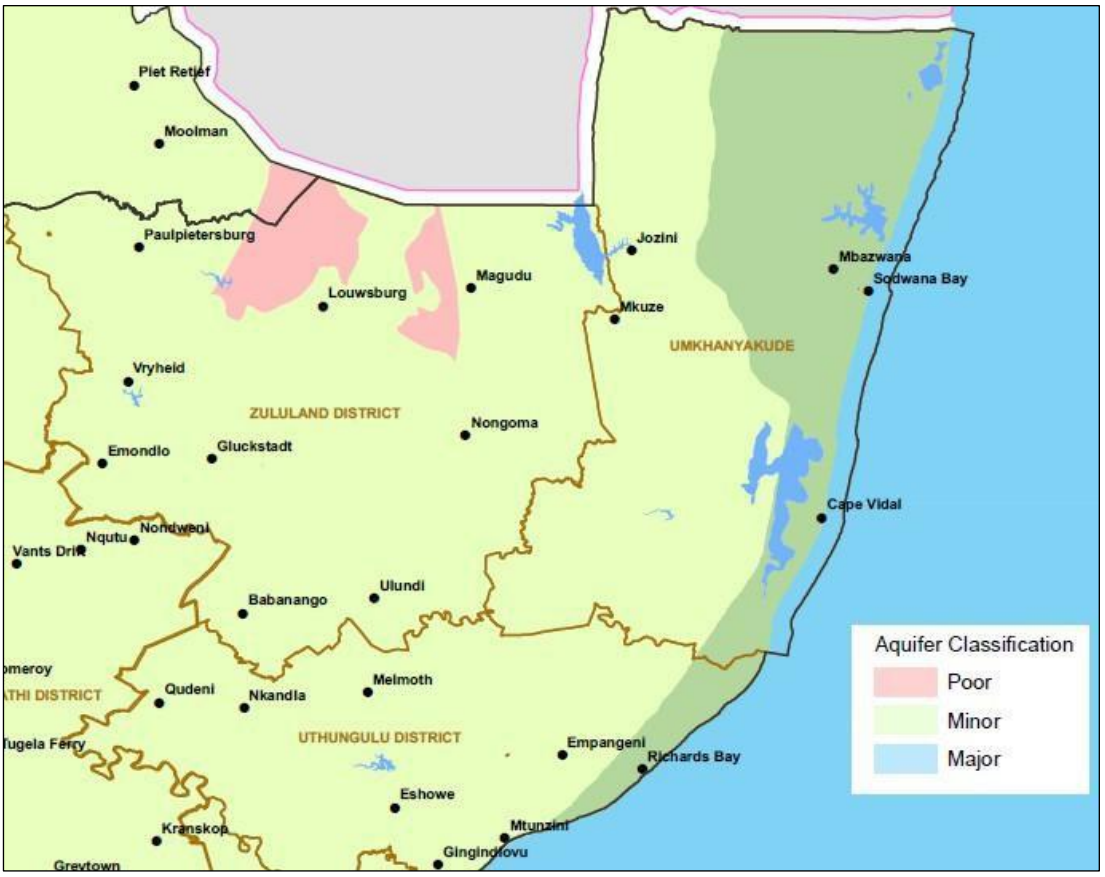


Figure 15. Aquifer classification of the northern region.
Source: (DWA, 2012)

5.6.7 Groundwater quality

Groundwater pollution and depletion are serious problems in many parts of South Africa. Poor and deteriorating groundwater quality is widespread and can be attributed to diverse sources in sectors such as mining, industrial activities, effluent from municipal wastewater treatment works, stormwater runoff from urban, especially informal settlements where adequate sanitation facilities are often lacking, illegal waste disposal dumps, return flows from irrigated areas, effluent discharge from industries and various other sources. The chemical character of groundwater within ULM is generally good. However some boreholes produce high concentration of dissolved salts with high concentration of sodium chloride (NaCl) and sulphates (SO_4) concentrations probably derived from the Dwyka and Vryheid formations (ZDM, 2004). The significant proportion of the local municipality experiences moderate to high specific electrical conductivity (EC) ranging from 150 – 370 mS/m. No specific trends with regard to the deterioration of groundwater quality with time have been established within the municipal area. Potential groundwater pollution sources in ULM may include: illegal disposal sites; wastewater treatment works; on-site sanitation; pit latrines; cattle kraals; and return flows from irrigated areas.

5.6.8 Groundwater use

Many communities within ULM rely on groundwater for their potable water supply needs, this includes both formal rural water schemes as well as rudimentary project communities. The rudimentary service level consists of boreholes equipped with hand-pumps or protected springs. Table 1-4 shows the utilization of groundwater resources within ULM. In addition, there are a number of formal and informal groundwater abstraction boreholes within ULM for which their source is unknown, but likely to be a groundwater source. Figure 1-12 shows the spatial distribution of boreholes within ULM as obtained from the National Groundwater Archives (NGA) database. On average boreholes in the area has a typical yield for fractured aquifers, implying that proper siting is critical for successfulness of boreholes and drilling targets should be based primarily on locating high yielding zones (targets), rather than selecting drilling position based on the location of communities to be supplied from groundwater. This would allow groundwater to be used as part of the bulk supply systems.

Table 6: Utilization of groundwater resources within Ulundi LM

Scheme Name	Settlement	Function	Traditional Authority	Water Source
Hlungulwane	Rural	Water	Nobamba	Borehole
Mvula	Rural	Water	Mlaba	Borehole
Njomelwane	Rural	Water	Mlaba	Borehole
Nkonjeni Hospital	Rural	Water & Sanitation	Not applicable	Nkonjeni WTW
Nkonjeni	Rural	Water	Buthelezi	Borehole
Nsukazi/Mfabeni	Rural	Water	Buthelezi	Borehole
Thuthukani	Rural	Water	Mlaba	Borehole
Babanango	Rural	Water & Sanitation	Not applicable	Unknown
Esigodiphola	Rural	Water	Nobamba	Unknown
Ezembeni	Rural	Water	Ndebele	Unknown
Isangoyane	Rural	Water	Mpungose	Unknown
Mabedlane	Rural	Water	Mpungose	Unknown
Nodwengu	Rural	Water	Mbatha	Unknown
Thokoza/Mtikini	Rural	Water	Mpungose	Unknown
Ukuku	Rural	Water	Unknown	Unknown

Source: Modified from ZDM (2004)

5.6.9 Groundwater monitoring

Groundwater is utilised extensively in the supply of water services in ULM, both as part of formal schemes and rudimentary service level consisting of boreholes equipped with hand-pumps. However, there are no records of active groundwater monitoring network located within the municipal area. Groundwater monitoring is important to ensure long-term sustainability of aquifers. Therefore, it is important to consider establishing a groundwater monitoring network that would monitor both quality and groundwater fluctuation on a specified interval in the municipal area.

5.6.10 Flood Risk Zones

Flood risk mapping is necessary to identify flood prone areas and to provide support for the management of flood risks areas, from high-level planning proposals to detailed designs. The assessment of flood risk involves evaluating hazards, or the magnitude of floods associated with a given probability of exceedance, or return period, and the vulnerability of the population, economic activity, environment and cultural heritage being exposed to the hazard.

Areas at risk of flooding are challenging to identify accurately across an area as large as Ulundi local municipal area, as detailed fieldwork surveys are required in determining flood risk areas. The KwaZulu-Natal Department of Human Settlements has developed a GIS based Flood Risk Information System (FRIS) for the province, which determines flood risks for a given location at a high level assessment (DHS, 2014). Figure 2-2 shows the 1:100 year floodlines for watercourses within ULM. The selection of the 1:100-year threshold is based on the National Water Act's (Act No 36 of 1998) prohibition of settlement being developed within the 1:100-year flood risk zone. This flood return period has been used to conservatively delineate the flood risk zones within ULM. The conservative approach is in keeping with the precautionary principle, which is particularly relevant in the face of climate change and land cover change which are likely to result in larger floods occurring more frequently and because of the use of models to determine the extent of flood risk zones which contain an inherent level of uncertainty.

5.7 Climate Change Impacts on Surface Water

In South Africa, the main climate change consequences related to water resources relates to increases in temperature, shifts in precipitation patterns and an increase in the frequency of flooding and droughts. The impacts of climate change based on current projections are that South Africa will exceed the limits

of economically viable land based water resources by 2050 (DEA, 2017). In ULM, climate change consequences on water resources relates to increases in temperature, changes in rainfall patterns and increase in the frequency of flooding and droughts. The increase in rainfall intensity will exacerbate scouring in rivers, potentially impacting on water supply and treatment infrastructure. Higher temperatures and little rainfall, would contribute to increased growth of algae, faster evaporation rates and drought. Figure 14 shows that only the north eastern part of ULM is prone to draught with Nongoma local municipality being the highest across the entire Zululand district municipality.

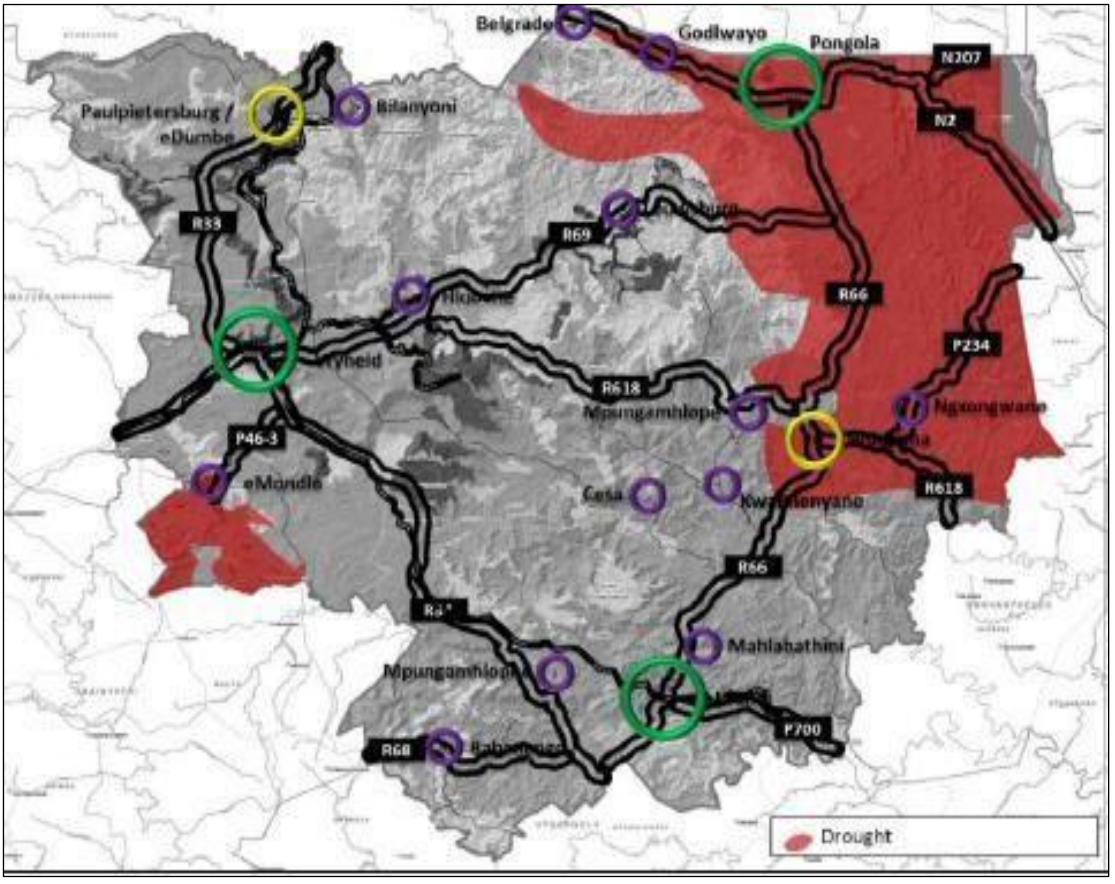


Figure 16: Drought prone areas in the Zululand DM
Source: ZDM, 2019

- **Vulnerability**

Similar to most municipalities in KwaZulu-Natal and the country as a whole, ULM is already experiencing the impacts of climate change, with an increase in temperature and more inconsistent rainfall patterns that result in droughts and water scarcity. The potential demand for water is expected to increase with economic growth, increased urbanisation, higher standards of living, and population growth. The Zululand Climate Change vulnerability Assessment and Response Plan (ZDMCCVARP,

2019) identified the following vulnerability issues that require appropriate mitigation and adaptation interventions regarding water sector:

- Decrease in the quantity and quality of drinking and irrigation water due to changes in rainfall patterns resulting into drought and consequently food security and vulnerability challenges, particularly for the municipality's rural poor;
- Poor water quality in rivers due shortage of water to dilute contaminants resulting from wastewater discharges and irrigation return flows;
- Increased erosion, overflowing of sewage systems, decrease in water quality and damage to public and private property;
- Increased runoff and erosion which may cause damage to infrastructure and result into chemical runoff into streams resulting into poor water quality.

- **Water Sector Adaptation**

During the times of drought often one of the first responses is to use water tankers to supply potable water to communities in the short-term, drill boreholes and make use of groundwater in the medium to long-term. The (ZDMCCVARP, 2019) identified those responses as adaptation responses to the decrease quality and quantity of water resources in the District. These adaptation options are also applicable for Ulundi LM.

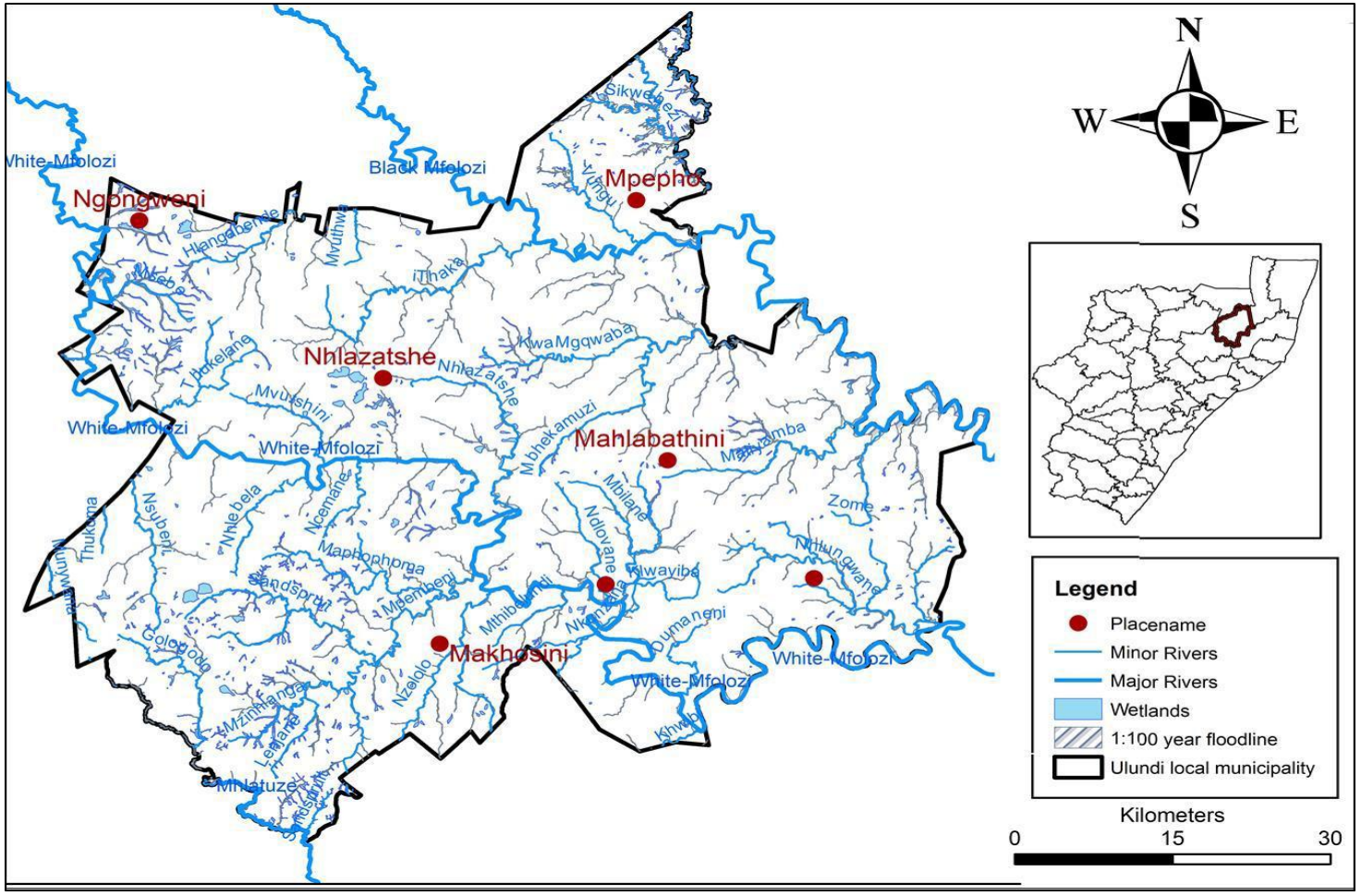


Figure 17: 1: 100 year Flood risk areas within Ulundi LM

6. Biodiversity

Biodiversity means 'the variety and variability among organisms and the ecological complexes in which they occur'. This means that biodiversity refers to everything form the smallest living organisms both marine and terrestrial, reptiles, insects, birds, animals, fish and more (including humans), as well as the trees, grasses, seeds, flowers, sedges, the water, air and soil upon which we rely for our existence, as well as the habitats, the networks and links between them all that make life itself possible and sustainable (Ezemvelo KZN Wildlife, 2011).

3.6.1. Critically Biodiversity Areas

In 2015 Ezemvelo KZN Wildlife developed the Zululand Biodiversity Sector Plan document. The primary purpose of mapping the Zululand District's biodiversity is to determine important areas for the conservation of biodiversity, in order to guide sustainable development as well as focus conservation efforts within the District. The biodiversity mapping profile covers the terrestrial and aquatic environs of the district and is reflected as a biodiversity sector map consisting of two main layers namely Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).'

According to Ezemvelo KZN Wildlife (2017), the Critically Biodiversity Areas (CBAs) are divided into two subcategories. Both these categories are considered crucial for supporting biodiversity features and ecosystem functioning and area required to meet the conservation targets. The two subcategories are:

Critical Biodiversity Areas: Irreplaceable

These areas are considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and functionality of ecosystems. These represent the only known localities for which the conservation targets for one or more of the biodiversity features can be achieved. There are no alternative sites available and all these areas must be protected to ensure the persistence of the species and habitat.

6.1 Land Use and Land Cover

Change in land cover is the greatest driver of biodiversity loss. These changes not only fragment landscape but alter biogeochemical cycles, climate, ecosystem processes and ecosystem resilience, thereby changing the nature of ecosystem services provision and human dependencies. These losses and changes pose significant challenges for meeting biodiversity conservation goals and targets (Jewitt et al., 2015).

Land use in the Ulundi Area is varied as shown in Figure 20, below. According to Ulundi LM (2020), there are six main land cover elements visible within the municipal area, namely urban areas, rural settlements and subsistence farming, woodlands, grasslands and plantations.

Urban areas - The urban areas are situated around Ulundi Town and stretches northwards along the R66. Smaller pockets of densely populated areas are situated along major transport routes, but is also scattered throughout the municipality at localities such as Babanango, Mpungamhlophe, Nkonjeni and Mahlabathini.

Rural settlements - The settlements are characterised by rural dwellings including areas such as Sterkstroom and Dlebe in the northern areas, Nondlovu and Xolo northeast of Ulundi, and Ntshemanzi and Nquklwane on the eastern boundary of the municipality

Subsistence farming - Subsistence farming is scattered throughout the municipal area, but more densely situated in close proximity to the rural settlement areas. The highest concentrations of subsistence farming are found near the settlements of Mpungamhlope, Nhlazatshe and Nkonjeni, with scattered subsistence farming activities around Dlebe.

Woodlands - Large areas of woodlands are situated on the evenly sloped areas on the north-eastern boundary of Ulundi with Nongoma. This area stretches from the Xolo surroundings (east) to Kwadayeni (west of R66).

Grasslands and Plantations - Grasslands are scattered throughout the municipal area. The lack of other activities and vegetation types makes this the main land cover category in the western areas around Bloubank and Ngongweni. Plantations are located in the southwestern parts of the municipality, and mainly grouped along the R68 leading to Babanango. Some isolated plantations are situated just north of Babanango. The area north of Nhlazatshe is characterised by bushlands, whilst some dense bushland groupings are situated north of Nkonjeni and Mahlabathini.

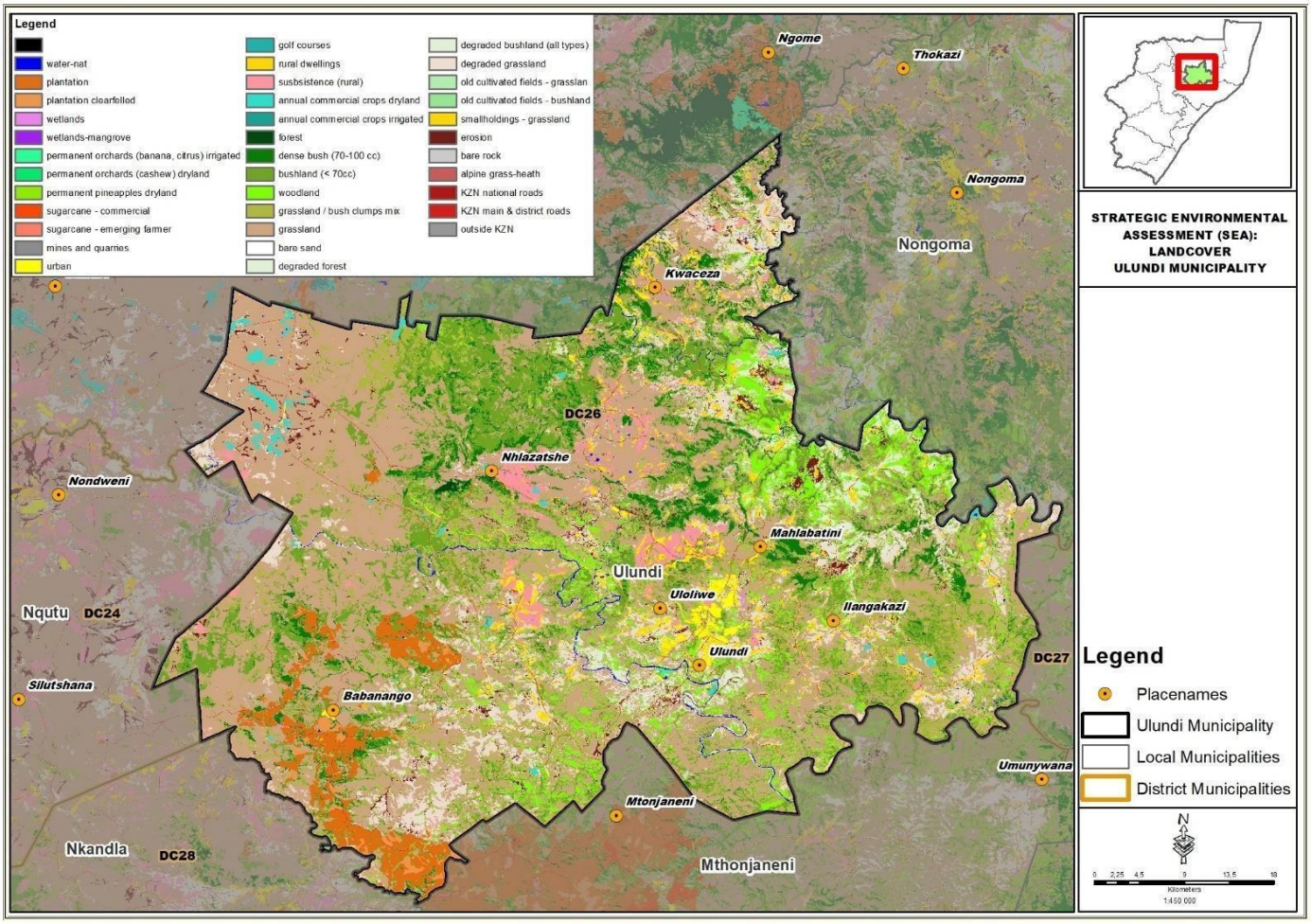


Figure 18: Land cover

6.2 Vegetation Type

A biome is a distinct community of plants, animals and other organisms, that is shaped by prevailing physical conditions such as climate and soil types, and which becomes the dominant form in an area. Each biome is made up of many vegetation types (SANBI, 2013a). According to Jewitt (2014), there are five biomes found within the Zululand District. Those are wetland biome, forest biome, grassland biome, savanna biome and Indian Ocean Coastbelt biome) Since Ulundi LM is situated at lower altitudes within the District, it therefore comprises of mostly savannah and grassland biomes.

There are eighteen vegetation types found within the Ulundi LM. The mostly dominated vegetation types can be described as follows:

The Northern Zululand Sourveld dominates most parts of the LM. It is found in the north-western, south western parts, north-eastern part as well as significant patches are also found on the south-eastern parts of the LM. The dominant structural vegetation type is wooded grassland, in places pure sour grasslands and rarely also dense bushveld thickets. Terrain is mainly low, undulating mountains, sometimes highly dissected, and also some moderately undulating plains and hills. In terms of the conservation status, the Northern Zululand Sourveld is *less threatened* with a national conservation status of 19%

The Zululand Lowveld is mostly found in the north-eastern and south-eastern parts of the LM. Extensive flat or only slightly undulating landscapes supporting complex of various bushveld units ranging from dense thickets of *Dichrostachys cinerea* and *Acacia* species, through park-like savanna with flat-topped *A. tortilis* to tree dominated woodland with broadleaved open bushveld with *Sclerocarya birrea* subsp. *caffra* and *A. nigrescens.* Tall grassveld types with sparsely scattered solitary trees and shrubs form a mosaic with the typical savanna thornveld, bushveld and thicket patches. In terms of the conservation status, the Zululand Lowveld is *vulnerable* and with a national conservation status of 19%.

The Midlands Mistbelt Grassland are found in the south-western part of the LM. It is scattered in broad belt in the form of several major patches including Melmoth-Babanango area. In terms of conservation, the Midlands Mistbelt Grassland is *endangered* and with a national conservation status of 23%.

The far edge of the north-western part of the LM is dominated by the Income Sandy Grassland. It is found on very flat extensive areas with generally shallow, poorly drained, sandy soils supporting low, tussock-dominated sourveld forming a mosaic with wooded grasslands (with *Acacia sieberiana* var *woodii*) and on well-drained sites with the trees *A. karroo, A. nilotica, A. caffra* and *Diospyros lycoides.* On disturbed sites *A. sieberiana* var *woodii* can form sparse woodlands. *Aristida congesta, Cynodon dactylon* and *Microchloa caffra* are common on shallow soils. In terms of the conservation status, the Income Sandy Grassland is *vulnerable* and with a national conservation status of 23%.

The Ithala Quartzite Sourveld is found at the centre and north-western parts of the LM. It is found on low mountain ranges and undulating hills with rocky lowlands. The general pattern is a mosaic of woody shrubs and small trees in rocky areas, interspersed in the grass layer. The vegetation structure varies according to altitude and rockiness, but the basal density of the grass sward is relatively low. This unit occurs in the zone between Grassland and Savanna where the dominant grassland gives way to woodland as elevation decreases. The grasslands are species-rich covering a variety of altitudes but sharing a common species unique to the dystrophic quartzite geology. In terms of the conservation status, the Ithala Quartzite Sourveld is *less threatened* and with a national conservation status of 27%.

Table 7: Vegetation type within Ulundi LM

Ulundi Vegetation types	% of KZN historical veg type within LM	% loss veg in LM based on 2011 landcover	% Remaining KZN veg in LM
Alluvial Wetlands: Subtropical Alluvial Vegetation	23.21	25.0	30.20
Alluvial Wetlands: Temperate Alluvial Vegetation	1.04	38.1	1.03
Dry Coast Hinterland Grassland	0.68	0.2	1.20
Eastern Mistbelt Forests	0.55	0.0	0.62
Eastern Scarp Forests: Ngome-Nkandla Scarp Forest	0.57	0.0	0.59
Eastern Scarp Forests: Northern Zululand Lebombo Scarp Forest	0.73	3.7	0.71
Freshwater Wetlands: Eastern Temperate Wetlands	0.02	97.0	0.00
Freshwater Wetlands: Subtropical Freshwater Wetlands	0.72	23.8	1.05
Freshwater Wetlands: Subtropical Freshwater Wetlands: Short Grass/ Sedge Wetlands	1.17	39.0	0.80
Income Sandy Grassland	2.92	19.8	3.74
Ithala Quartzite Sourveld	8.74	7.5	9.27
KwaZulu-Natal Highland Thornveld	0.83	8.5	1.04
Midlands Mistbelt Grassland	4.89	33.3	8.97
Northern KwaZulu-Natal Moist Grassland	0.04	46.0	0.03
Northern Zululand Mistbelt Grassland	0.63	0.0	1.09
Northern Zululand Sourveld	28.18	13.9	30.52
Paulpietersburg Moist Grassland	7.06	28.6	9.25
Zululand Lowveld	16.89	21.9	17.69

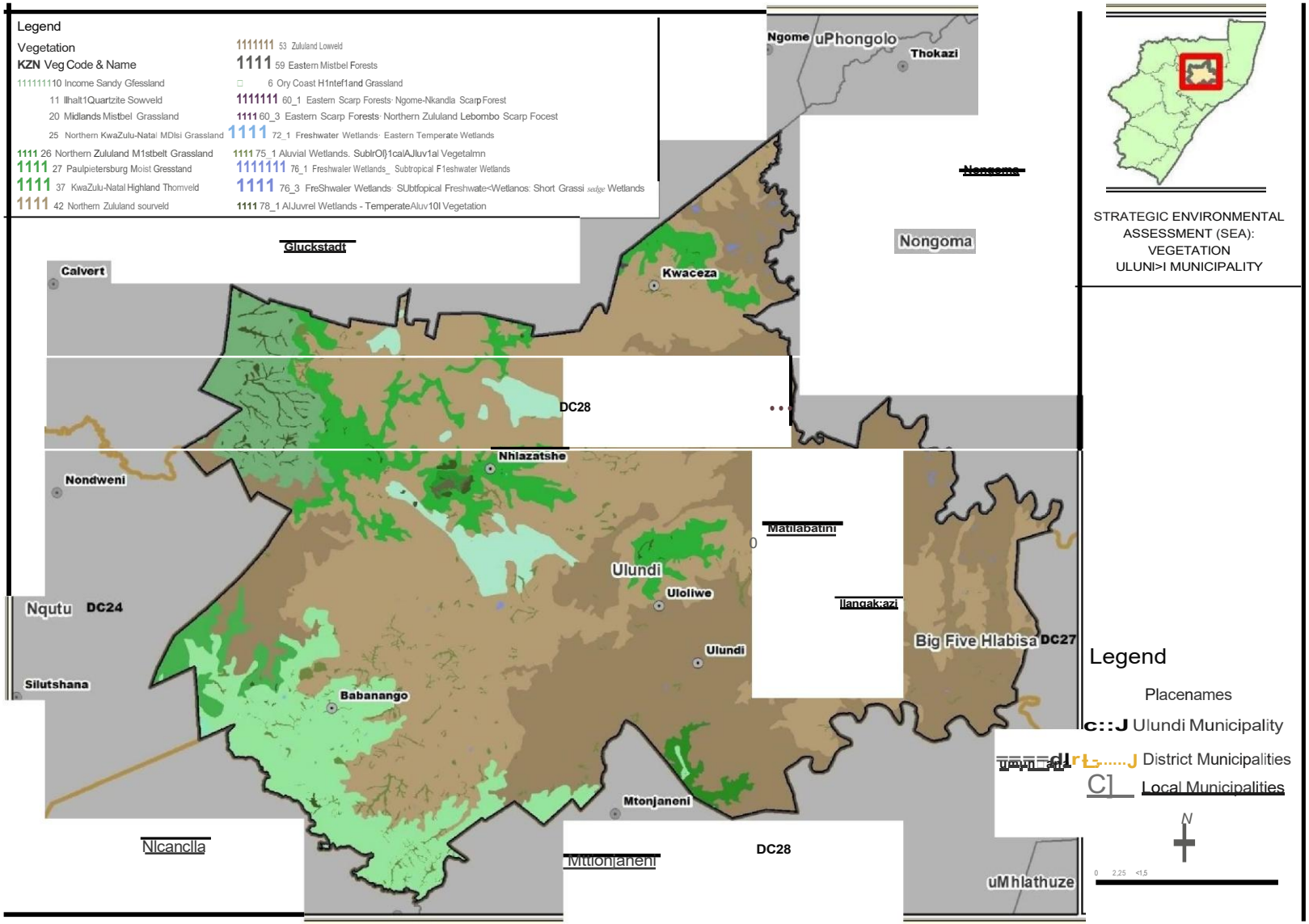


Figure 19: Vegetation types

6.3 Threatened Ecosystem (Terrestrial)

Ecosystem threat status indicates the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition related to a series of thresholds. Ultimately, the functioning of a threatened ecosystem is comprised as they reach certain measurable thresholds (SANBI, 2013a). Ecosystem status aims at identifying threatened ecosystem (here vegetation types). It draws on the Red List classification drawn by the International Union for Conservation of Nature (IUCN) is the world's main authority on the conservation status of species. The status of all species is determined using the categories determined by IUCN categories:

- Critically Endangered (CR) – species considered to be facing an extremely high risk of extinction in the wild
- Endangered (EN) – species considered to be facing a very high risk of extinction in the wild
- Vulnerable (VU) – species considered to be facing a high risk of extinction in the wild
- Least threatened (LT) – species do not qualify for the threatened category but is close to be classified under one of the categories in the near future (Mucina and Rutherford, 2006).

Focusing conservation efforts on threatened species is crucial for maintaining biodiversity. However, only conserving the natural habitats in which the species occur will ensure species persistence. The identification of threatened ecosystem is aimed at addressing this.

The information on threatened ecosystem in derived from SANBI (2009). The Threatened Ecosystem are shown in Figure 22, below. There are no threatened ecosystems which are considered as being critically endangered, endangered and less threatened. All of the threatened ecosystems found within Ulundi LM are considered vulnerable and are described as follows:

1. Vulnerable

(i) Eastern Scarp Forest (FOz V1)

Eastern Scarp Forest – FOz V1 Eastern Scarp Forest is considered Vulnerable. It falls under the Forest Biome. It is only found in KZN. Ulundi LM is one of the LMs in KZN where the Eastern Scarp Forest is found. Other LMs where the Eastern Scarp Forest can be found include Ethekwini MM, Hlabisa LM, Maphumulo LM, Mbonambi LM, Mkhambathini LM, Ndwedwe LM, Nkandla LM, Nongoma LM,

Ntambanana LM, The Big Five False Bay LM, Ubuhlebezwe LM, Umlalazi LM, Umshwathi LM, Umzumbe LM, uPhongolo LM and Vulamehlo LM.

(ii) Imfolosi Savanna and Sourveld (KZN 59)

The Imfolosi Savanna and Sourveld is considered Vulnerable. It falls under the Savanna and Grassland Biome. It is found only in KZN province. The Ulundi LM is one of the few LM's in KZN where the Imfolosi Savanna and Sourveld is found. Other LMs in KZN include Nongoma LM, Ntambanana LM, Mthonjaneni LM and KZDMA27.

(iii) Low Escarpment Mistbelt Forest (FOz ll4)

The Low Escarpment Mistbelt Forest is considered Vulnerable. It falls under the Forest Biome. It is only found in Mpumalanga and KZ Provinces in South Africa. The Ulundi is one the LM's in KZN where the Low Escarpment Mistbelt Forest is found. Other LMs in KZN include Emnambithi/Ladysmith LM, Okhahlamba LM, Endumeni LM, Newcastle LM, Utrecht LM, Dannhauser LM, eDumbe LM, Abaqulusi LM

(iv) Midlands Mistbelt Grassland – Gs 9

The Midlands Mistbelt Grassland is considered Vulnerable. It falls under the Grassland Biome. It is located only in KZN and Eastern Cape Provinces. The Ulundi LM is of the LMs in KZN where the Midlands Mistbelt Grassland. Other LMs with the Midlands Mistbelt Grassland are Umuziwabantu LM, Umshwathi LM, uMngeni LM, Mooi Mpofana LM, Impendle LM, Umsunduzi LM, Mkhambathini LM, Richmond LM, Nquthu LM, Msinga LM, uMvoti LM, Ubuhlebezwe LM, Nkandla LM, Ndwedwe LM, Maphumulo LM, Dr Nkosazana Dlamini-Zuma and uMzimkhulu LM.

(v) Ngongoni Veld – SVs 4

The Ngongoni Veld is considered Vulnerable. It falls under the Savanna Biome. It is located in KZN and Eastern Cape Provinces. The Ulundi LM is one of the LMs in KZN which has the Ngongoni Veld. Other LMs with the Ngongoni Veld in KZN are Ethekwini LM, Vulamehlo LM, Umzumbe LM, Umuziwabantu LM, Ezingoleni LM, Hibiscus Coast LM, Umshwathi LM, Umngeni LM, Msunduzi LM, Mkhambathi LM, Richmond LM, Umvoti LM, Ubuhlebezwe LM, Ntambanana LM, Umlalazi LM, Mthonjaneni LM, Nkandla LM, Ndwedwe LM, Maphumulo LM and uMzimkhulu LM.

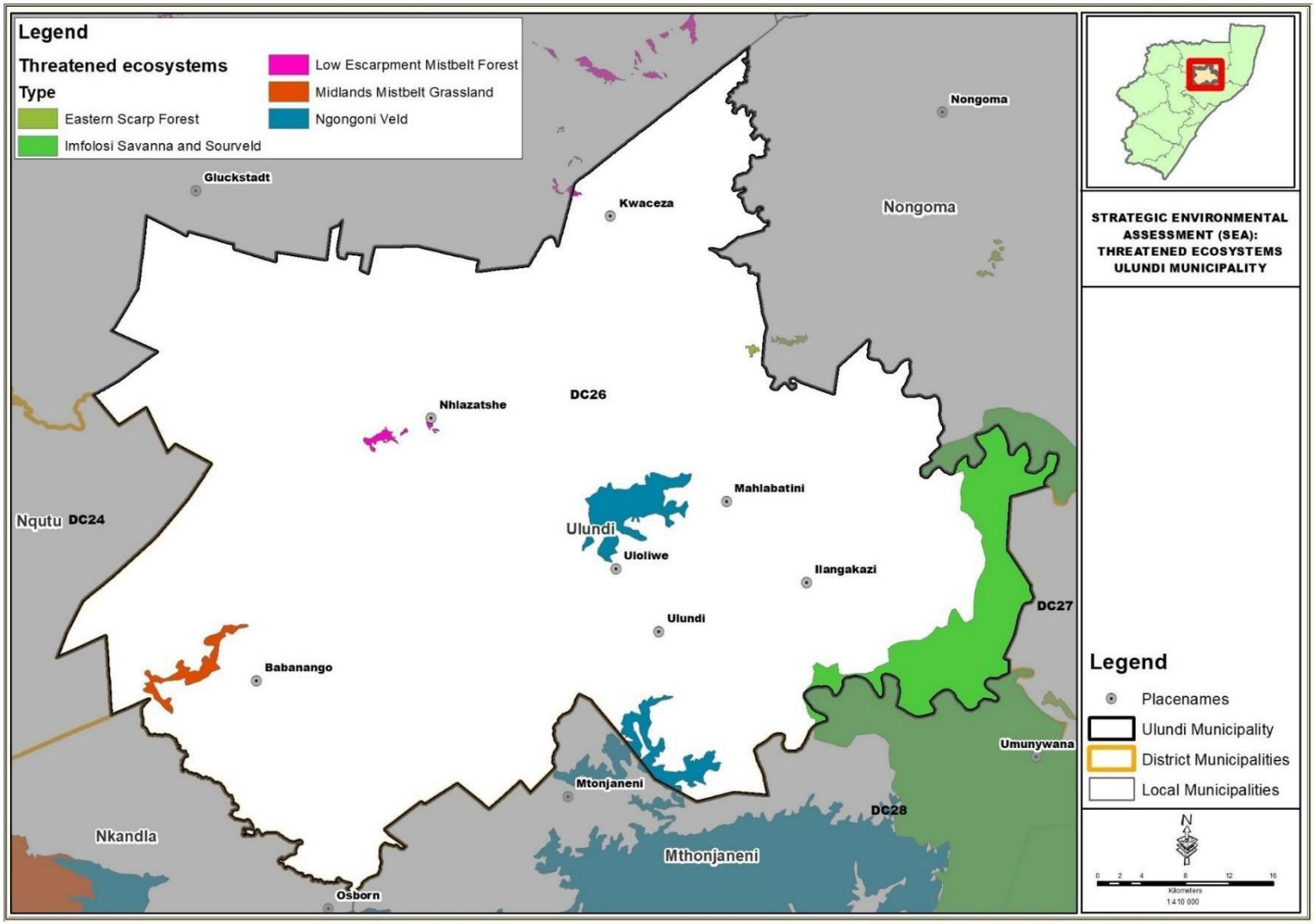


Figure 20: Threatened Ecosystems

6.4 Impact of Climate Change: A Biome Based Perspective

There are five biomes found in Ulundi LM. According SANBI (2011), each biome has a characteristic 'climate envelope' or a range and pattern of temperature and rainfall values within which it occurs. A drastic change in climate will naturally result in a biome shift. According to the Zululand District Municipality (2019), the shift in biomes will result in a change to the ecosystems and vegetation found in the Zululand District Municipal Area. In the Zululand District Municipality, it is projected that under a medium risk climate scenario, a nearly complete loss of the Grassland Biome will occur with it being replaced by the Savanna Biome and a small patch of Indian Ocean Coastal Belt Biome in the south-east of Zululand District Municipal Area. Under a high risk climate scenario, it is forecast that the Grassland Biome will be completely replaced by the Savanna Biome.

The Long-Term Adaptation Scenarios Report on biodiversity highlights the Grassland and Indian Ocean Coastal Belt biomes, which are some of the biomes are found in Ulundi LM are most vulnerable and in need of protection, restoration and / research. These biomes require highest priority action. Within the biomes found in the Ulundi Municipal Area, there are several threatened ecosystem types. These are Eastern Scarp Forest, Imfolosi Savanna and Sourveld, Low Escarpment Mistbelt Forest, Midlands Mistbelt Grassland and Ngongoni Veld. These are all considered as being vulnerable ecosystem types.

According to SANBI (2013b), for the grassland biome, significant change and loss of habitat is projected due to climate change. This is likely to be related to the high-altitude location of the biome and its susceptibility to warming effects, as well as the possible increase in tree cover due to a longer growing season and CO_2 fertilization. The savanna biome, on the other hand, is projected to expand with its geographic range partly replacing grassland. However, an increase in woody cover could shift the structure of some areas of the savanna biome towards woodland and even forest. The invasion of woody plants (alien and indigenous) into the grassland biome has major implications for the delivery of ecosystem goods and services to people, notably water delivery from highland catchments and grazing. Such shifts have extremely important implications for conservation and ecosystem service delivery, as well as ecosystem processes such as wildfire.

6.4.1 Threatened Flora and Fauna

According to Ezemvelo KZN Wildlife (2014), the IUCN Red List or Red Data List is the world's most comprehensive inventory of the global conservation status of plant and animal species. The status of all species is determined using the categories determined by IUCN which are as follows:

- Critically Endangered (CR) – species are considered to be facing an extremely high risk in the wild
- Endangered (EN) – the species is considered to be facing a very high risk of extinction in the wild
- Vulnerable (VU) – the species is considered to be facing a high risk of extinction in the wild
- Near Threatened (NT) – when evaluated against IUCN criteria, does not qualify for a Threatened category but is close to qualifying for or is likely to qualify in one of those categories in the near future.
- Data Deficient (DD) – there is inadequate information regarding the species' population size, distribution or threats for an assessment to be made.

It is worth noting that species that are listed as critically Endangered (CR), Endangered (EN) and Vulnerable (VU) are considered as Threatened (Ezemvelo KZN Wildlife).

6.4.2 Fauna

The ZDM serves to be vital to a number of red data faunal species (Ezemvelo KZN Wildlife, 2015). The area comprises of a number of species that are of national importance which includes: African Wild Dog, Black Rhino, a number of vulture species, and a number of less charismatic yet equally important smaller fauna.

Many of the faunal species require large areas for feeding which highlights the importance of maintaining large connected areas of natural habitat that remains crucial for ensuring the conservation of important faunal species. This relates particularly to the corridor from the Babanango area through the eMakhosini-Ophathe Heritage Park, along the Mfolozi River, Hluhluwe-iMfolozi Park, and northwards. The eMakhosini-Ophathe Heritage Park is a critical foraging area for vultures.

- **ESAs Species Specific**

These areas are identified as being modified areas that provide support function to threatened or protected species.

Landscape and Local Corridors

The maintenance of connectivity is essential to a number of movement related ecological processes, including species migration, seasonal and altitudinal dispersal, and range displacement in response to climate change.

6.4.3 Terrestrial Corridors

There are two types of terrestrial corridors that have been identified, it is Landscape and Local.

- **Landscape Corridors:** these are found at the provincial scale and were developed as a series of altitudinal and bio-geographic corridors to facilitate evolutionary, ecological and climate change processes and to create a linked landscape for the conservation of species in a fragmented landscape.
- **Local Corridors:** these are developed at a district scale to create fine scale links within the landscape that facilitates ecological processes and ensure persistence of critical biodiversity features.

Three of the KZN Provincially derived terrestrial landscape corridor fall within the Zululand District and of the three terrestrial landscape corridors, one fall within the Ulundi LM. That is the Opathe Imfolosi Link Corridor which links the Hluhluwe Imfolosi Park and the eMakhosini-Opathe Heritage Park and runs along the southern boundary of the Zululand District. This means that this landscape corridor stretches along the southern border of the Ulundi municipal area, including the protected areas and up along the R34.

A Protected Area is defined as any area declared or proclaimed as such in terms of section or listed in the Second Schedule to the KwaZulu-Natal Nature Conservation Management Act No. 9 of 1997; or any of the protected areas referred to in section 9 of the National Environmental Management: Protected Areas Act No. 57 of 2003.

According to Ulundi LM (2016), the Ulundi LM has a number of environmental sensitive areas, of which some areas are already formally protected. The Emakhosini Ophathe Heritage Park and Game reserve is located on the southern boundary of the municipality directly south of the White Mfolozi River. The Game reserve is directly east of the R66, whilst the heritage park stretches west from the R66 to Babanango in the west.

Table 8: Protected Areas

Proclaimed Name	Management Authority	Proclamation year	Total area (ha)	Proclaimed
eMakhosini Heritage Park	EKZNW & AMAFA	2006	18919	partial
Ophathe Game Reserve	EKZNW & AMAFA	1991	8825	yes

Source: Zululand Biodiversity Sector Plan (February 2010) cited in Ulundi LM (2016)

6.4.4 Stewardship Sites

Biodiversity stewardship is the conservation of the biodiversity by the people. By encouraging private and communal landowners to formally become custodians, taking responsibility for natural assets on their private and communally owned land it helps achieve conservation goals with positive, proactive partnerships and cooperative management being the key ingredient (Ezemvelo KZN Wildlife, 2011).

The Ulundi LM has one Stewardship area which is located to the west of Babanango area.

6.4.5 Alien Invasive Species

According to SANBI (2013a), an invasive alien species is a species that:

- Has been introduced into an area outside its natural range, by intentional or unintentional human action;
- Once established in the new habitat, has spread in such a way that it threatens ecosystem, habitats or species within the environmental or economic harm

Ulundi LM (2020) indicates that the presence of alien invasive species threatens habitats, ecosystems or other species. It threatens the availability of the scarce water resources. Their presence may result in

economic or environmental harm, or harm to human health. Alien trees and shrubs increase above ground biomass and evapotranspiration and thereby decrease both surface water runoff and groundwater recharge. The spread of invasive species is the second greatest threat to biodiversity, after habitat transformation.

There are many identified invasive plants in Ulundi which includes Parthenium hysterophorus Famine Weed. This Alien invasive plant is causing threat to Agriculture, Livestock, nature conservation and also causing serious threat to the health of human lives (Ulundi LM, 2020).

It is understood that there are initiatives being undertaken by the Ulundi LM to address the issue of alien invasive species. The initiatives include:

- A ward-based initiative which aims at restoring the available grazing land that has been invaded by alien plant species. The LM intends to source external funding form relevant state departments in order to effectively address the threats posed by the alien invasive species within the LM.
- An alien/weed eradication program that is promoting protection of the existing vegetation. This program is reviewed every year
- An Invasive Alien Plants Business Plan that was developed to assist on sourcing funds externally other than the LM relying on internal budget.

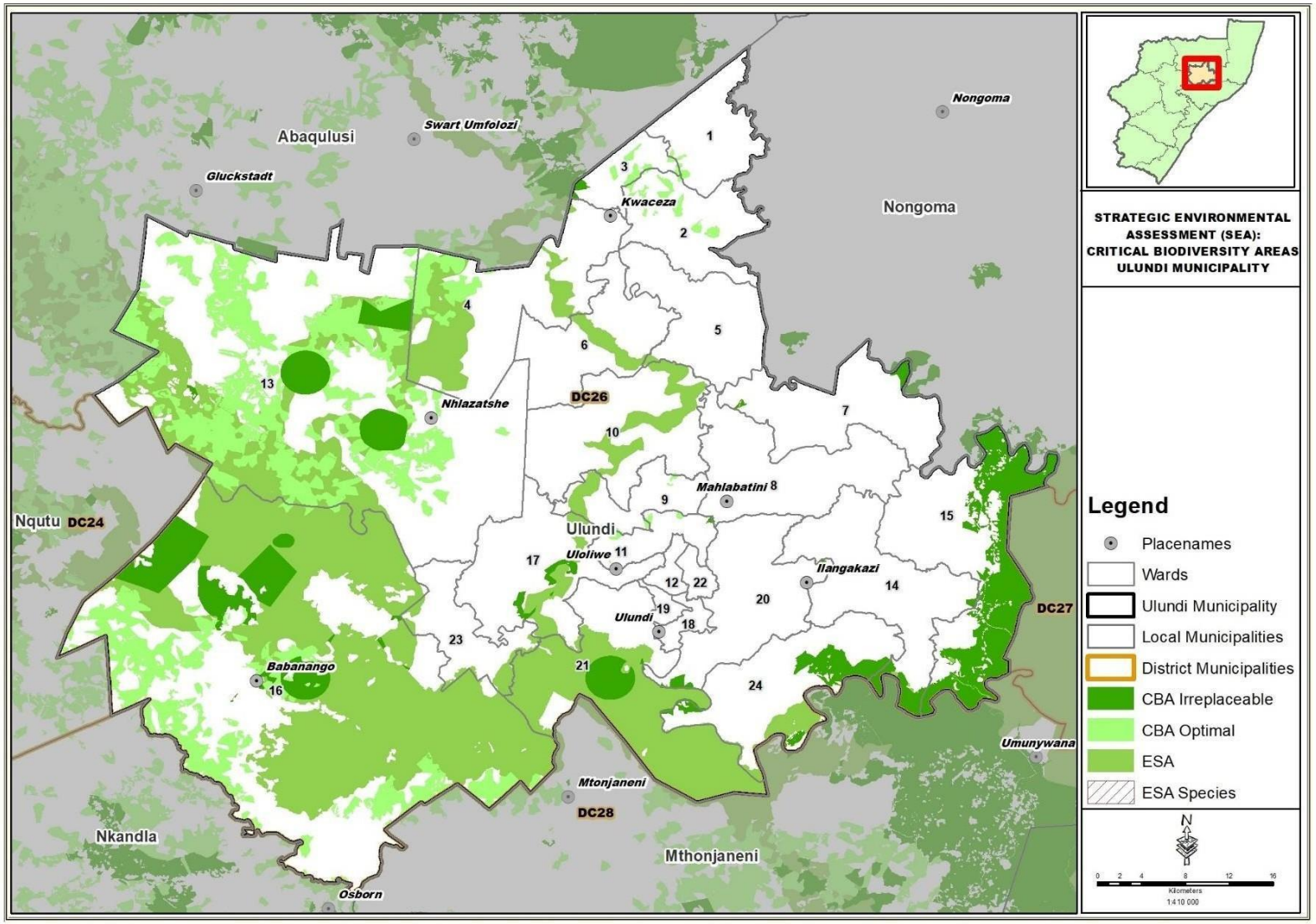


Figure 21: Critical Biodiversity Areas

6.5 Climate Change Impact on Biodiversity

Biodiversity in the Zululand District Municipal Area has been positively influenced by the conservation areas. It has been negatively influenced by inter alia: land degradation (mainly due to overgrazing, closed mines lacking rehabilitation and poor land management practises), unsustainable harvesting of natural resources, unregulated veld burning, the spread of invasive alien species, increased pollution, poor waste management, population growth, spatial development (such as the expansion of agricultural and urban areas), and an extended drought that has affected most of KwaZulu-Natal since 2015 due to climate change (Zululand DM, 2019).

Indigenous bird species are used as potential indicators of climate responses for several reasons. They are highly mobile and sensitive to changes in habitat and climate, for example, certain bird species are sensitive to changes in vegetation structure (e.g. woodland versus grassland species), and some would show behavioural responses to changes in temperature and rainfall. According to Zululand DM (2019), climate change will increase already high rates of biodiversity degradation. Species rich hotspots will come under threat.

6.6 Agricultural Potential and Soil

According to Ulundi LM (2020), agriculture is fulfilling a significant role in the Ulundi Municipality economy Ulundi LM. Although agriculture is one of the least GVA (2%) and employment (4%) contributor to the local economy, it remains one of the key sectors of the municipality in terms of food security and potential links to the secondary and tertiary sectors. It plays a major role in ensuring growth within rural communities and is crucial for safeguarding of food security within these areas

Ulundi LM has a limited number of cultivated areas, with very few pockets of land having high and good agricultural potential mainly in Mahlabathini, Babanango and Dalton. In terms of commercial agricultural activities, although few and limited, these activities are located within Nkonjeni, Mabedlana, Kwadayeni, Babanango, Mpungamhlope, Bloubank and Ngongweni as evidenced in the map below. Forestry, sugarcane, sub-tropical fruits and livestock farming is prominent within the municipality but however limited processing of these products occurs to diversify and boost the local economy.

The Department of Agriculture has produced an agricultural framework that identifies areas with agricultural potential, which is mapped below. The classification of areas is according to different categories. These categories focus on mitigating and limiting the impact of any proposed change of land use on agricultural production and to protect agricultural land. The table below provides the implications of each land category that has been identified in the map illustrated below:

Table 9: Agricultural Land Categories

AGRICULTURAL CATEGORY	DESCRIPTION
Category A	It is regarded as Irreplaceable and has a very high potentail agricultural land that should be retained exclusively for agriculture use so as to ensure national food security. Included in this category is also idenitfied grazing land that has a very high production value for sustained livestockproduction.
Category B	Land is categorised as Threatened in this category and is regarded as high potenial agricultural land. Due to limted amount of Category B land in the province and in the country, all efforts should be focused on retaining land within this Category for predominatly agriculture use. Every effert should be made to limit degradation of the natural agricultureal resources in accordance with CARA (43 OF 1993)
Category C	It is regarded as the Primary Agricultural Land. This is land with moderate agricultural potentail on which signifacant interventions would be required to achieve viable and sustianable food production, although agriculture is still the majority land use in the rural landscpae
Category D	It is regarded as Secondary Agricultural Land. It is land with low agricultural potential. This land requires significant interventions to enable sustainable agricultural production
Category E	It is regarded a Mixed Agricultural Land and it is land with limited to low potentail for agricultural production.
Permanetly Transformed	Areas dermacated as Permanetly Transformed applies to land that has been converted irreversibly to non-agricultural land uses. This include urban/built up areas, roads, mines and quarries and which can therefore no longer be utilized fior agriculturalproduction purposes
Proclaimed Reserve	Land within this category has been formally proclaimed as either national or provincial nature reserves under the relevant legislation and is therefore not avaiable for agricultural purposes.

The different categories of agricultural land, depicted in Figure 24 below, can summarised as follows:

- The largest part of the municipality is categorised as a mixture of secondary (category D) and mixed agricultural land (category E). This implies generally low agricultural potential.
- The areas around Babanango are categorised as Threatened Agricultural land (category B) and therefore have high agricultural potential. This area is characterised by forestry activities.
- The municipality further has four conservation areas. These areas are situated in the following locations:
    - Eastern boundary adjacent to the Hluhluwe Umfolozi Reserve;
    - Just north of Kwambambo;
    - On the western municipal boundary with Nquthu near Njanbuna;
    - Ophathe Game Reserve.

The Ulundi Municipality has a limited number of cultivated areas, which is mainly grouped within the eastern parts of the municipality. Another large concentration of formal agricultural activities is situated to the north of Mpepho. Smaller groupings of cultivated land are distributed all over the municipal area.

Commercial agricultural activities, although few and limited, are scattered in the western part of the municipal area, while traditional agricultural practices are more concentrated in the eastern half. Forestry activities are limited to the areas around Babanango, especially along the R68 road in the south of the municipality.

Given the importance of agriculture in the LM, there is diversity of agricultural activities and therefore a diversity of agricultural issues and opportunities. The Ulundi (2015) indicates that there are **m**any factors that have the ability to impede the sustainable growth and development agriculture sector in Ulundi LM include, inter alia:

- Over exploitation of resources;
- Loss of ecosystem services – flooding, erosion and infrastructure damage;
- Alien plant encroachment;
- Institutional and procedural weaknesses;
- State of rivers
- Soil erosion, over grazing and uncontrolled land use in traditional areas;
- Uncontrolled urban and rural sprawl;

- SDF, LUMS and IDP are promoting unsustainable development;

On the other hand, there are, opportunities that exist with the aim of uplifting households in rural settlements using agriculture. According to the Ulundi LM (2016), the programmes that can be implemented include:

- Food security programmes: opportunities exist for the development of food security programmes, which will not only have social implications, but will also contribute to the development of rural agriculture. The development of these programmes will not only ensure that rural communities are provided with food and job opportunities to an extent, but it will also ensure that land which has high agricultural potential does not lie idle and underutilized and left vulnerable to degradation.
- Agricultural programmes: The development of agricultural programmes is also vital to sustainable rural development and agrarian reform, as it has potential to address food security issues. These programmes should be packaged in a manner that enables knowledge transfers between existing and emerging farmers (especially those who come from a subsistence background).

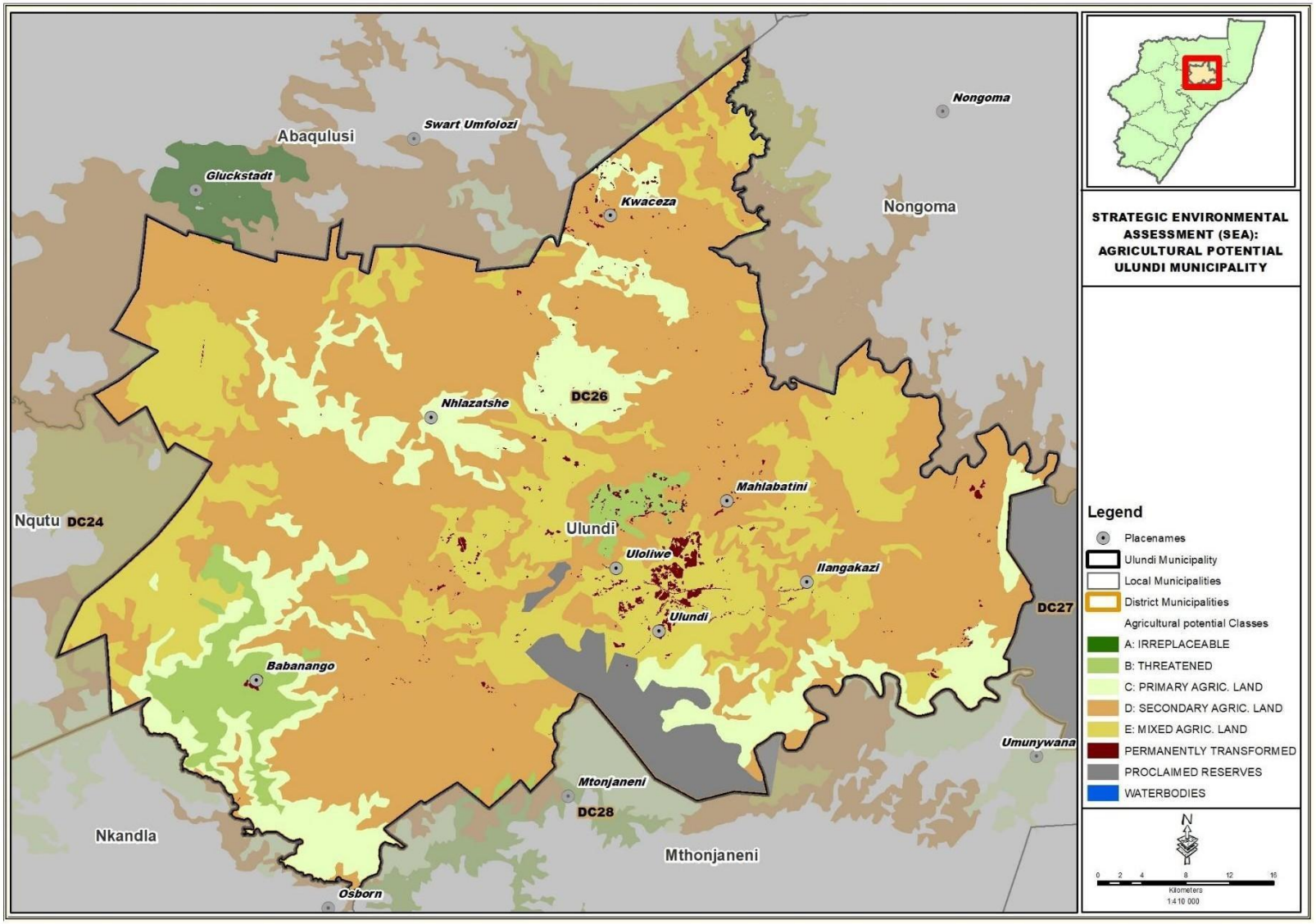


Figure 22: Agricultural Potential

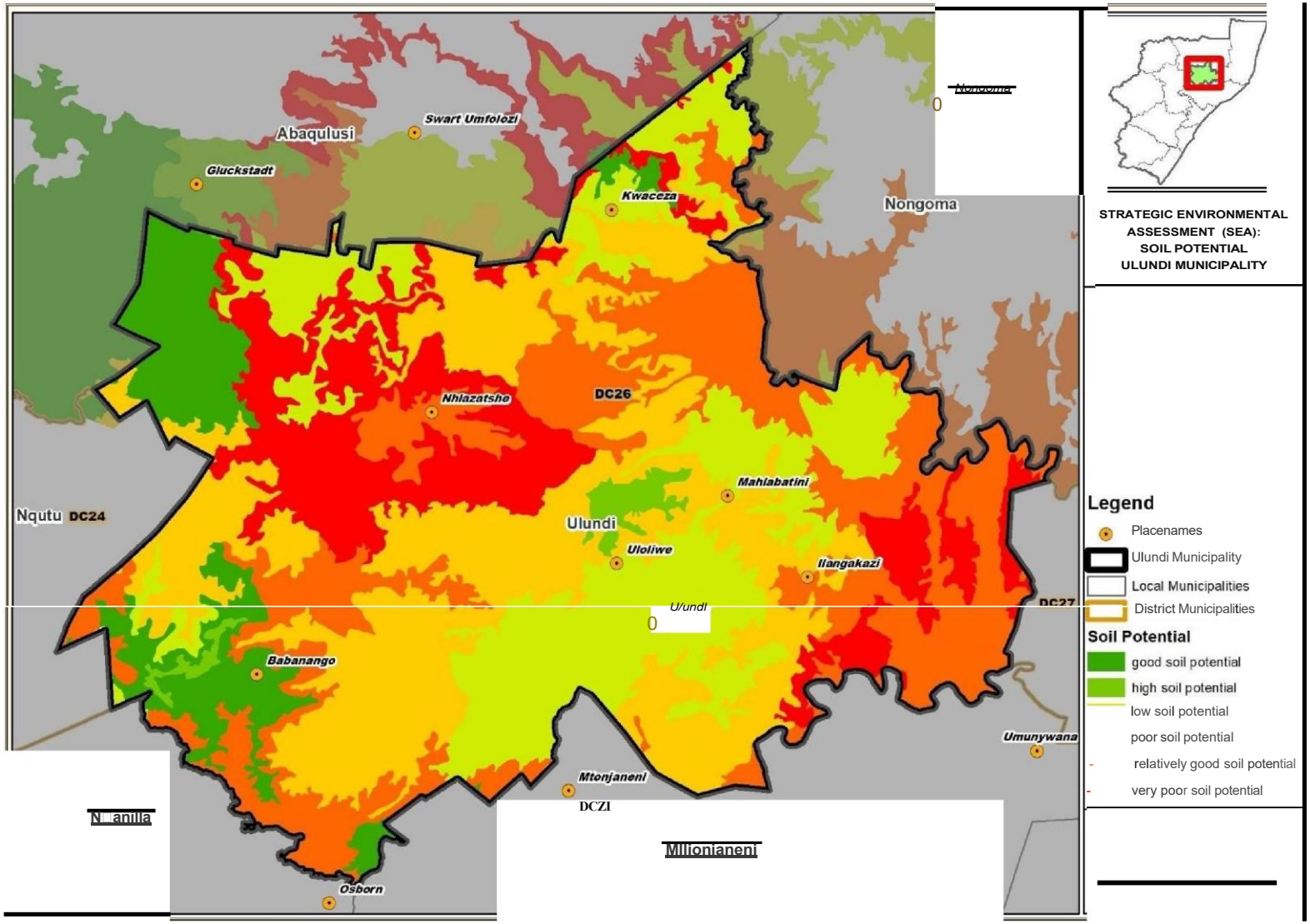


Figure 23: Soil Potential

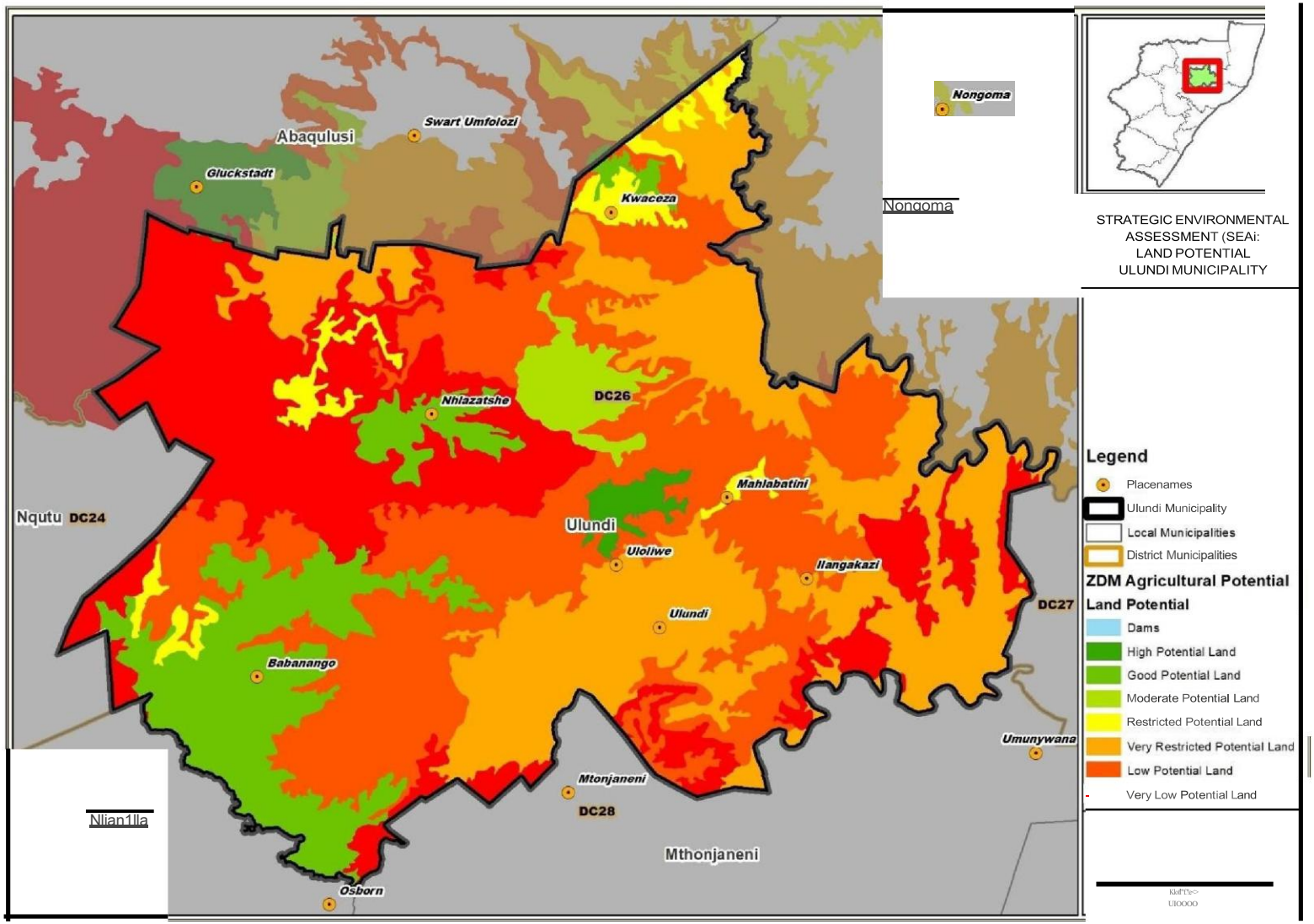


Figure 24: Land Potential

6.7 Impact of Climate Change on Agricultural Sector

Despite the potential for expanding agricultural production in the Zululand District Municipal Area, it is predicted that climate change will affect the agriculture sector both positively and negatively. The Long Term Adaptation Scenarios Flagship Research Programme (LTAS) forecasts that in the future, parts of eastern South Africa will become more suitable for grain production. The LTAS has also forecast that the production of sugarcane and fruit (such as apples and pears) will be increasingly vulnerable to damage from a predicted expansion of the areas affected by agricultural pests. Furthermore, it is predicted in LTAS that climate change is forecast to increase the total average rainfall in the east of South Africa. This could increase the agricultural output of maize, soybean and sugar cane as well as that of commercial forestry plantations. However, climate change is also predicted to increase temperatures and rainfall variability as well as decrease water security, which will negatively affect the quantity of agricultural production in the District Municipal Area. These effects are expected to raise the frequency and severity of floods, droughts and fires in South Africa, resulting not only in agricultural losses but also in impacts to most other sectors of the local economy as well. By decreasing agricultural yields, climate change could impact commercial agriculture by reducing profitability and job opportunities in the sector .

Table 9: Vulnerability Assessment for Agriculture in ZDM

Indicator	Exposure	Sensitivity	Adaptive Capacity
Change in grain (maize, wheat & barley) production	Yes	High	Low
Change in Soya Bean Production	Yes	Medium	Low
Change in Sugarcane Production	Yes	High	Medium
Change in fruit production	Yes	High	Medium
Change in other crop production areas (e.g. vegetables, nuts, etc.)	Yes	High	Medium
Increased areas for commercial plantations	Yes	High	Low
Increased exposure to pests such as eldana, chilo and codling moth	Yes	High	High
Increased risks to livestock	Yes	High	High
Reduced food security	Yes	High	Medium

Source : Adapted from Zululand DM Climate Change Vulnerability Assessment and Response Plan (2019)

7. SOCIAL ENVIRONMENT

7.1 Demographic Profile

Prior to the advent of democracy there was no reliable information available about the country as a whole. In 1996, the post-apartheid government conducted its first population census. This was followed by a census in 2001. The next census was scheduled for 2006, but because Statistics South Africa (Stats SA) was not in a position to conduct a successful census, this was rescheduled for 2011. A Community Survey took the place of the 2016 census. The Stats SA used to conducts a population census once in every five years. The five year interval was, however, changed to 10 years interval. The Community Survey aims at bridging the gap in between censuses. The information on the Community Survey is provided at a municipal level and not at a ward level as compared to the information provided in the census which goes to the ward level and beyond.

7.1.1 Population size

The population of the Ulundi LM is 205 762 (as of 2016). In 2011, the population of Ulundi was 188 317, meaning that there has been an increase in the number of people residing in the municipality.

Table 12 : Total Population

Total Population	
Municipal Area	**3 250 km²**
2011	2016
188 317	205 762

Source: Statistics South Africa,Census (2016)

7.1.2 Gender Ratio

According to Stats SA 920160, there are 111 544 females which are more than 94 218 males in Ulundi LM. These findings are similar to the 2011 census which also showed that there were more females than males in Ulundi LM. This (having more females than males) may be attributed to the possibility of males seeking employment outside Ulundi area in areas such as Vryheid, Richards Bay, Durban and Johannesburg.

Table10: Gender

Gender		
	2011	**2016**
Male	85 061	94 218
Female	103 255	111 544

Source: Statistics South Africa,Census (2016)

7.1.3 Age

The population is characterised by young and youthful population. The significant number of the population are still attending school and are depends.

Table 11 : Age

Age (Years)	
< 9	51,173
10 - 19	48,732
20 - 29	32,748
30 - 39	17,742
40 - 49	13,692
50 - 59	11,451
60 - 69	63,90
> 70	63,90

Source: Statistics South Africa,Census (2016)

7.1.3 Household income

Table 13: Household income

RANDS PER ANNUM	NO	%
No income	4492	12.76%
R1 - R4 800	1736	4.93%
R4 801 - R 9 600	3249	9.23%
R9 601 - R 19 600	7834	22.26%
R 19 601 - R 38 200	8736	24.82%
R 38 201 - R 76 400	4205	11.95%
R 76 401 - R 153 800	2430	6.90%
R 153 801 - R 307 600	1583	4.50%
R 307 601 - R 614 400	703	2.00%
R 614 001 - R 1 228 800	119	0.34%
R 1 228 801 - R 2 457 600	61	0.17%
R 2 457 601 or more	49	0.14%
TOTAL	**35197**	**100.00%**

Source: Ulundi IDP (2018/19)

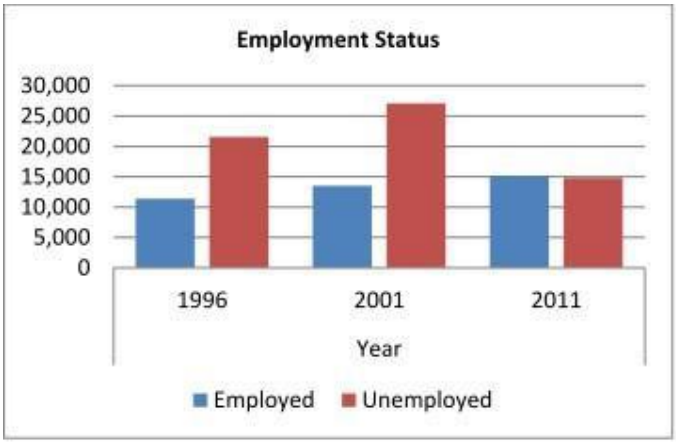
An indigent household are those households earning less than

R2 500 per month combined earnings in the house. In terms of this criterion alone, some 45% of the Households who resided in the Ulundi Municipal Area were indigent.

The largest proportion of households – some 68% - earned between R4,801 and R76,400 per annum in 2011.

7.1.4 Employment

The unemployment profile provides that 49.45% of the population in Ulundi is unemployed. •According to the Statistics SA 2015 data more than half of the populations (50.4%) within Ulundi LM are dependent on some form of grant and subsidy.



Whilst there seemed to be an increase in the number of economically active persons that are formally employed between 1996 to 2001 and 2001 to 2011 within the Municipal Area, it must be noted that the unemployment rate in 2011 was 49.45%. This excludes those who are "discouraged work-seekers" (12.75% of the population aged between 15 and 65 years).

Employment Status (15yrs – 65yrs)(2011)

STATUS (2011)	NO	%
Employed	15136	50.55%
Unemployed	14805	49.45%
Total Economically Active	**29941**	**28.80%**
Discouraged Work-Seeker	13259	12.75%
Other Not Economically Active	60779	58.45%
TOTAL	**103979**	**100.00%**

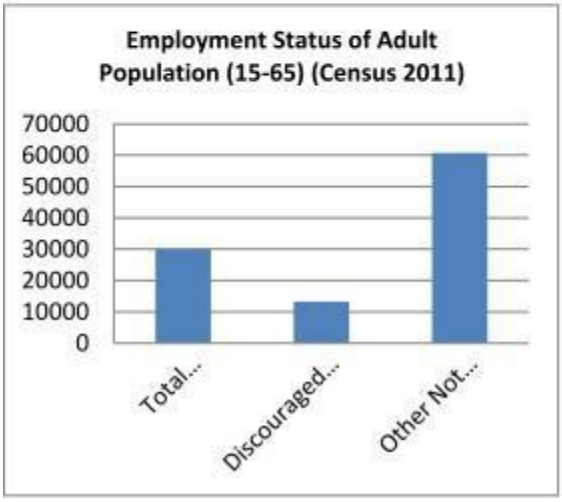


Figure 26: Employment Status
Source: Ulundi IDP (2019/20)

7.2 Services

7.2.1 Piped water

Table 14:Piped Water

Piped Water		
	2011	**2016**
Access to piped water	23 715	23 283
No access to piped water	11 483	15 271

Source: Statistics South Africa,Census (2016)

7.2.2 Sanitation

Table 15: Improved Sanitation

Improved Sanitation		
	2011	**2016**
Flushed/Chemical Toilet	13 549	12 808
Other	21 649	25 475

Source: Statistics South Africa,Census (2016)

7.2.3 Electricity

Table 16: Electricity

Electricity	
Connected to electricity	101 320
Other sources	21 116

7.2.3.1 Energy sources for Cooking

In 2011 electricity was the main source of energy used for cooking (73%) followed by wood, paraffin and gas. 59% of the population uses electricity for heating. In 2016 it continued to be the predominant source of energy for cooking (61%). This common resource is followed by the traditional use of wood for heating. Alternative sources used for cooking and heating may be means to save electricity and therefore this may not be a true reflection of access to electricity.

7.3 Transportation Infrastructure

7.3.1 Roads Network and Infrastructure

The construction and rehabilitation of roads within the Ulundi Municipality was identified as a high priority in the compilation of a Comprehensive Infrastructure Plan (CIP) for the Municipality. The priority of the construction and rehabilitation of roads in the CIP was prompted by the need for improved transport routes, improved access to the central business district and the provision of better quality roads for use by the communities in the Municipality. Responsibility for the compilation of the CIP vests in the Zululand District Municipality and a draft thereof is awaited by the Ulundi Municipality.

The Ulundi Municipality is traversed by four main routes namely the R68 which connects Babanango to Nquthu in the west and Mthonjaneni in the east; the R34 which traverses the Municipality from Makhosini in the south east to Ngongweni and Geluckstadt in the north west; the R66 stretching in a north south direction connecting Ulundi Town to Nongoma in the north and the R34 and Melmoth in the south; and the P700 which connects Ulundi town to the Hluhluwe Umfolozi Park in the west. Only the main thoroughfares and Ulundi Town have blacktop roads; the remainder of the Municipality is serviced by gravel roads. Most of the settlement areas within the Municipality are reached via gravel roads extending from the R34, the R66 and the P700. The National Department of Transport has commenced with the rollout of a programme to determine and provide clarity on the expected roles of each sphere of Government with regard to road management and maintenance.

In KwaZulu-Natal, this process is driven by the Provincial Department of Roads. Responsibility for the road network within the service area of the Municipality is vested in two entities – the Ulundi Municipality and the

KZN Department of Transport. While the Technical Services Directorate of the Municipality is mainly focused on the Ulundi Town and Township access roads, the KZN Department of Transport takes responsibility for the maintenance and upgrading of rural roads within the Municipality.

In total the Technical Services Directorate maintains 100 kilometres of road, of which 74.5% are tarred (blacktop surface) and 25.5% are gravel roads. The responsibility of the KZN Department of Transport covers main roads (the "P" roads), district roads (the "D" roads) and local roads (the "L" roads). The "P" roads within the municipal area comprise a total of 449.88 kilometres of which 34% are blacktop surfaced roads and the remaining 66% are gravel roads. Of the 304.33 kilometres of district roads for which the Department is responsible, only 6% are tarred while the remaining 94% are gravel roads. The entire network of 45.92 kilometres of local roads for which the KZN Department of Transport is responsible consists of gravel roads.

7.3.2 Public transportation

Transportation of people and goods within the service area of the Municipality can be effected by road, by rail or by air. In addition to the road network within the Municipality, there is Prince Mangosuthu Buthelezi Airport situated just south of the town of Ulundi and is also accessible from the R66 and it is functioning. A freight railway line traverses the Municipal area in an east west direction stretching from Ngongweni in the west, via Ulundi through Ngqolothi in the east to Richards Bay.

7.3.3 Mode of transportation

The largest proportion of the population within the Ulundi Municipality (74%) is pedestrians who do not have access to any other regular mode of transportation. This is indicative of three possible scenarios, namely the lack of funds to utilise public transport, the lack of a decent and operational public transport system within the Municipality, or the lack of need to utilise transport due to unemployment, which leads to localised travel only, with no need to travel to Ulundi, except in special circumstances. The remoteness of most areas and the rural nature of the Municipality plays a big role in the transportation usage, as the roads infrastructure is under-developed, which makes the rural areas highly inaccessible. Lack of transportation access is also a major contributory factor to the lack of economic activity within the rural areas of the Municipality.

In terms of public transportation, the taxi industry is still the dominant source; however, other role-players have entered this market. Chief among these are the "bakkie" transport providers that, while they are cheaper than the taxis and can access most rural areas, represent a serious concern regarding the safety of commuters and goods. The meter taxi has come in Ulundi and covers the township and the periphery.

With the high level of dependence of the lower order nodes on the town of Ulundi for economic opportunities and retail services, it is imperative that the rural areas in the Municipality be made more accessible through the provision of a transportation infrastructure. This will not only make Ulundi more accessible to the rural population, but will further make the rural areas more accessible to economic opportunities and possible businesses that might relocate to these areas.

7.3.4 Intermodal facility

There are significant traffic volumes that flow to and through the town of Ulundi as a consequence of it being a regional commercial centre. Adjacent to the newly developed Senzangakhona Mall the KwaZulu-Natal Department of Transport and Ulundi Municipality constructed a modern Intermodal Facility to replace the totally inadequate taxi rank located in the Ulundi CBD. The Municipality has contributed an amount of R 7 million to the construction of the intermodal facility – these funds were secured from the Kwazulu-Natal Department of Cooperative Governance and Traditional Affairs (COGTA). The old rank is still functioning, used by local taxis while the Intermodal Facility is used by long distance taxis.

7.3.5 Municipal (Ulundi) airport

An announcement was made in March 2011 that the municipal airport is set to resume the handling of commercial flights on a daily basis between Ulundi and Pietermaritzburg, initially on a promotional basis only. The ownership of the municipal airport was transferred from the Office of the Premier to the Zululand District Municipality in April 2007, negotiations to facilitate this process having commenced early in 2004, shortly after the termination of government-subsidised flights in 2003. For the next three years the KwaZulu-Natal provincial government provided financial assistance to the District Municipality to subsidise the cost of operations at the airport.

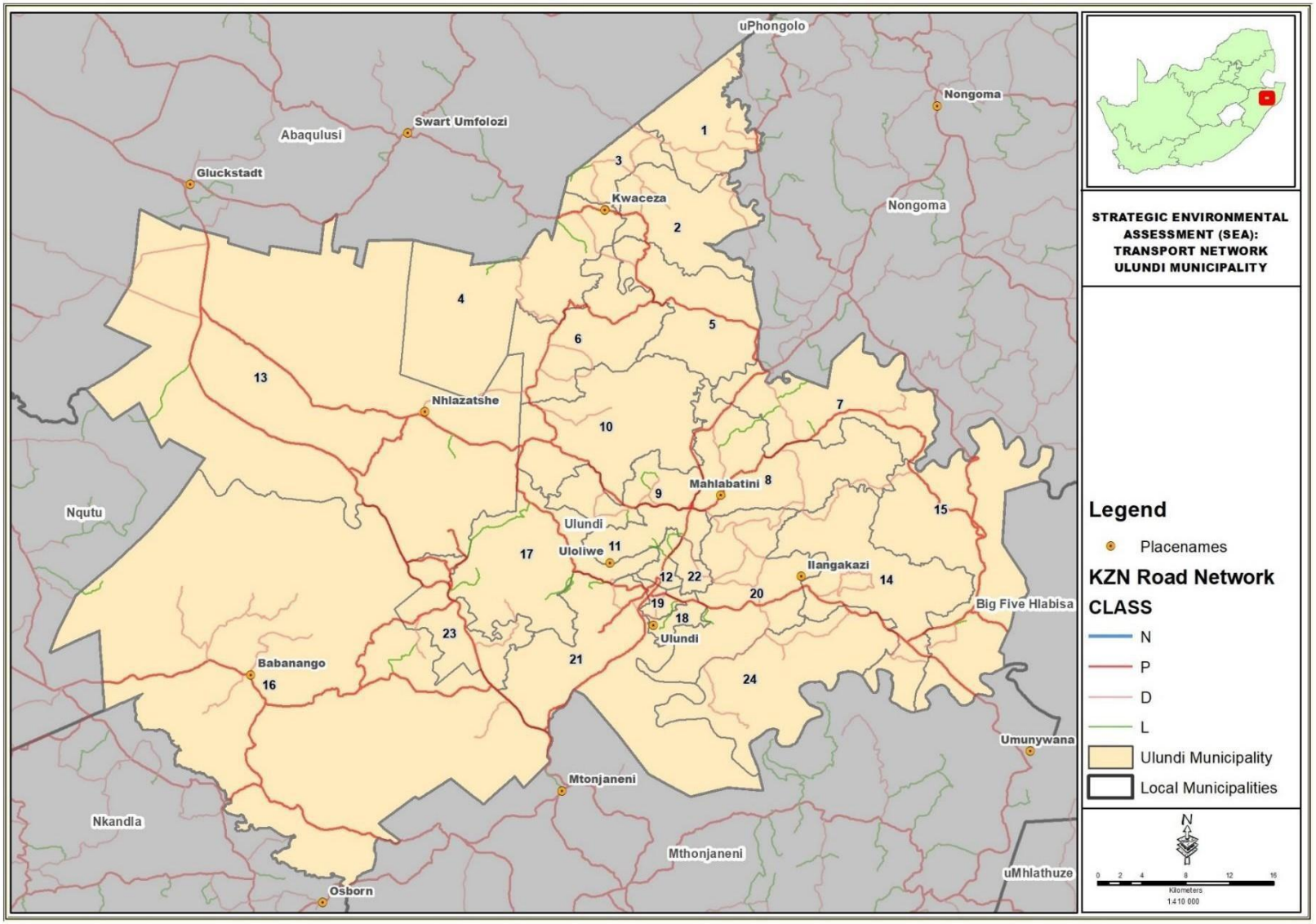


Figure 27: Transport Network

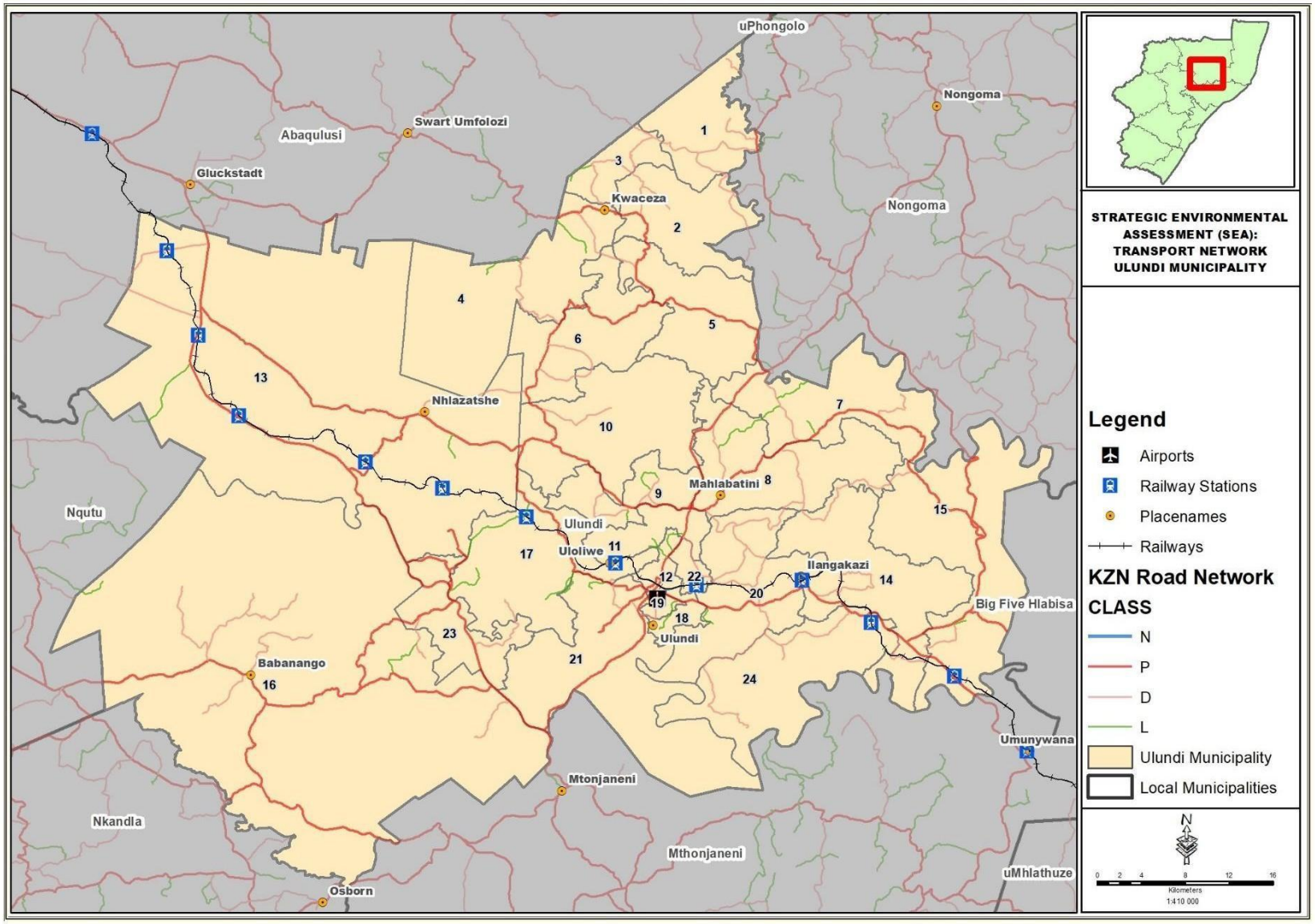


Figure 28: Air and Rail Transport Networt

8. Planning and development

8.1 Spatial Context

Ulundi LM is one the five LMs, other four LMs being eDumbe, Abaqulusi, Nongoma and uPhongolo, constituting the Zululand District. It is located on the southern boundary of the Zululand District Municipality in the north-eastern part of KwaZulu-Natal, as shown in Figure 1. The municipal area is approximately 3,250 km^2 in extent and includes the towns and settlements of Ulundi, Nqulwane, Mahlabathini, Babanango, Mpungamhlophe and Ceza as well as nine Traditional Authorities of Buthelezi, Mbatha, Mpungose, Ndebele, Nobamba, Ximba, Zungu, Nsimbi, Buthelezi-Emphithiphithini. It consists of 24 wards. The Ulundi LM is the administrative centre and seat for the Zululand District Municipality and a well-equipped airport.

The largest part of its area is rural and underdeveloped. Approximately half of the Municipal area consists of commercial farms and the area supports a substantial agricultural community. The town of Ulundi represents the only urban centre in the Ulundi LM area and accommodates approximately 40,000 people. It is situated on the R66 which connects Ulundi directly to Nongoma in the North and Melmoth to the south, then leading to the N2 which connects the town to the coastal cities. The town of Ulundi is the only formal urbanised node and houses all formal (first economy) economic activities within the municipality. The areas surrounding the town of Ulundi are characterised as large, densely populated tribal areas with an informal settlement pattern. These areas are completely reliant on Ulundi for employment, goods and services. Due to the high population density, concentration and service demands, large sections of these tribal areas can be classified as emerging urban settlements.

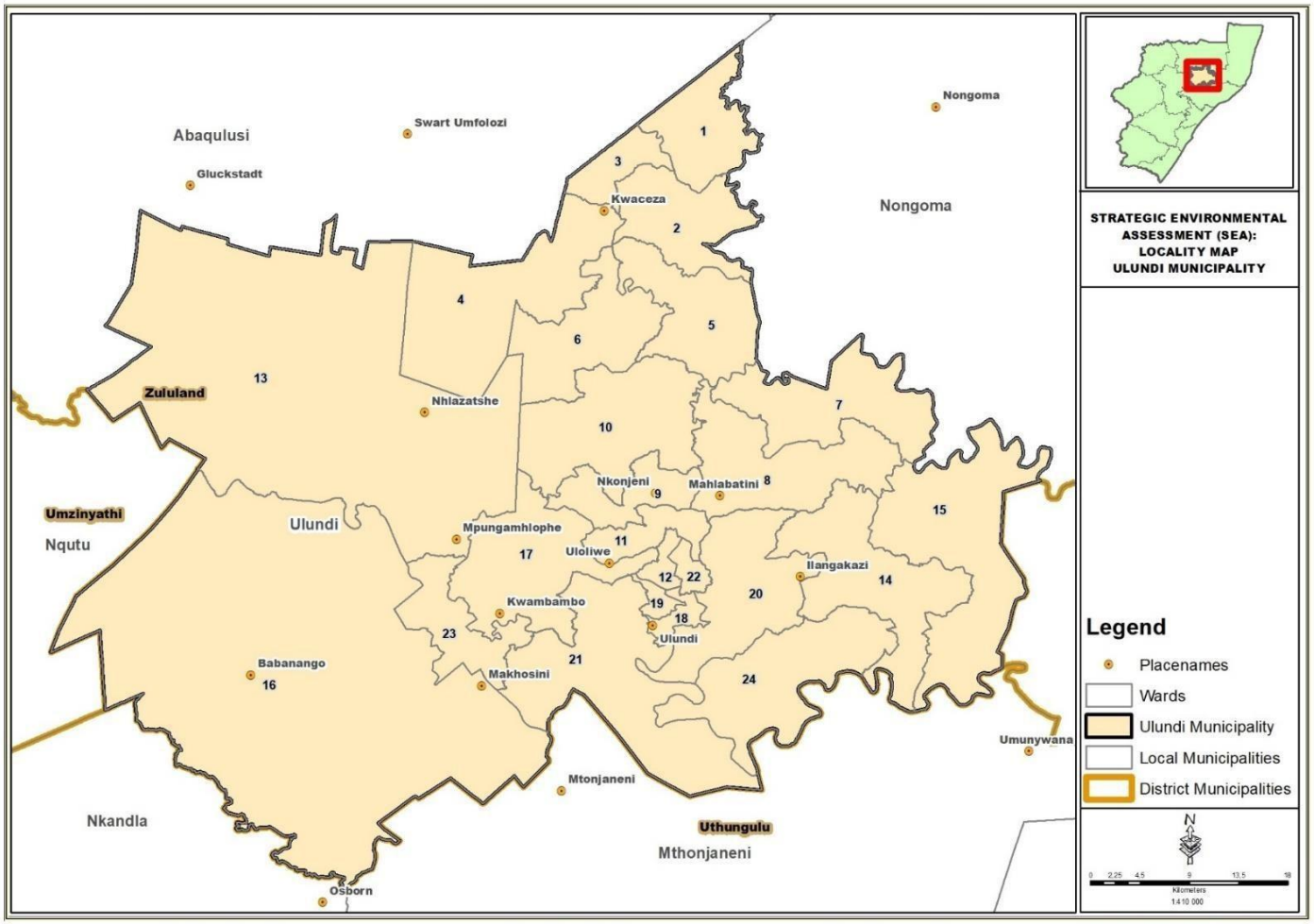


Figure 29: Locality Map

8.2 Spatial Development Concept

8.2.3 Settlement Pattern

According to Ulundi LM (2016), The existing residential areas distinguishes between the rural settlements and the urbanised. The majority of the Ulundi is rural with informal settlements. These settlements are scattered unevenly in areas situated on the eastern part of the municipality under Traditional Council. They have poor infrastructure and service provision and are located far from areas with economic opportunities.

The settlement pattern of Ulundi is highly influenced by topography, transport routes and land ownership. Settlements within Ulundi tend to be situated along transport routes and at the foot of mountainous areas. The nature of rural settlements poses a major challenge for both policy makers and service delivery agencies. Communities have articulated the need for services such as access roads, water and electricity. While the government has made significant progress in this regard, the process has proved to be very expensive. The spatial structure or lack thereof causes inefficiency and accounts for relatively high service delivery costs.

It needs to be noted that some of the settlement clusters are situated outside the Traditional Council areas. This is apparent in Nhlazatshe and to a limited extent in Sterkstroom. Although the settlement clusters are fairly evenly distributed within the Traditional Council areas, there are four areas with distinctly higher densities than the other settlement clusters. These are:

- Nqulwane in the eastern part of the municipality, largely as the result of the location of Okhukho coal mine in that area;
- Babanango, which developed as a result of agriculture and forestry
- Denny Dalton / Mpungamhlophe, which developed as a result of R34 and rail infrastructure; and Ceza to the north which developed in response to the establishment of supportive land uses such as a hospital, clinic and other related social support services in the area. It is also situated in the road network system (R66, R33, R34, P700, P701 etc). It is therefore a connection and concentration point for people and activities

8.2.3 Administrative entities

Land ownership in the western part of the municipality is private and is mainly being used for agriculture and forestry. The eastern part of the municipality is Ingonyama Trust land and is used for rural settlement purposes in a scattered, low density pattern, as well as for subsistence farming. Settlements not situated within the area of a Traditional Council include Babanango, Bloubank, Nhlazatshe, Lottery, Sterkstroom and Ngonweni. Only a few areas have official cadastral boundaries and include Ulundi Town and the areas of Mahlabathini, Babanango, Mpungamhlope and 2 small areas near Lottery and Sterkstroom.

8.2.4 Land ownership

Majority of the land in the eastern parts of Ulundi is owned by the Ingonyama Trust Board (ITB). This land is used for rural settlement purposes of a low-density nature, as well as for subsistence farming. In the western part of the Ulundi Municipality is privately owned land, land used for agriculture and commercial farming. On the far southern edge of the municipality there is a small portion of land used for AMAFA monuments, these areas are those that have been protected and have historical significance.

8.2.5 Land reform programme

The majority of the western portion of the municipality is under land claims which have not yet been settled. The area affected is approximately 661km², which is about 19% of the total area of the municipality. It is recommended that areas where claims have been settled development be encouraged and that continued agricultural support be provided (Ulundi, 2016).

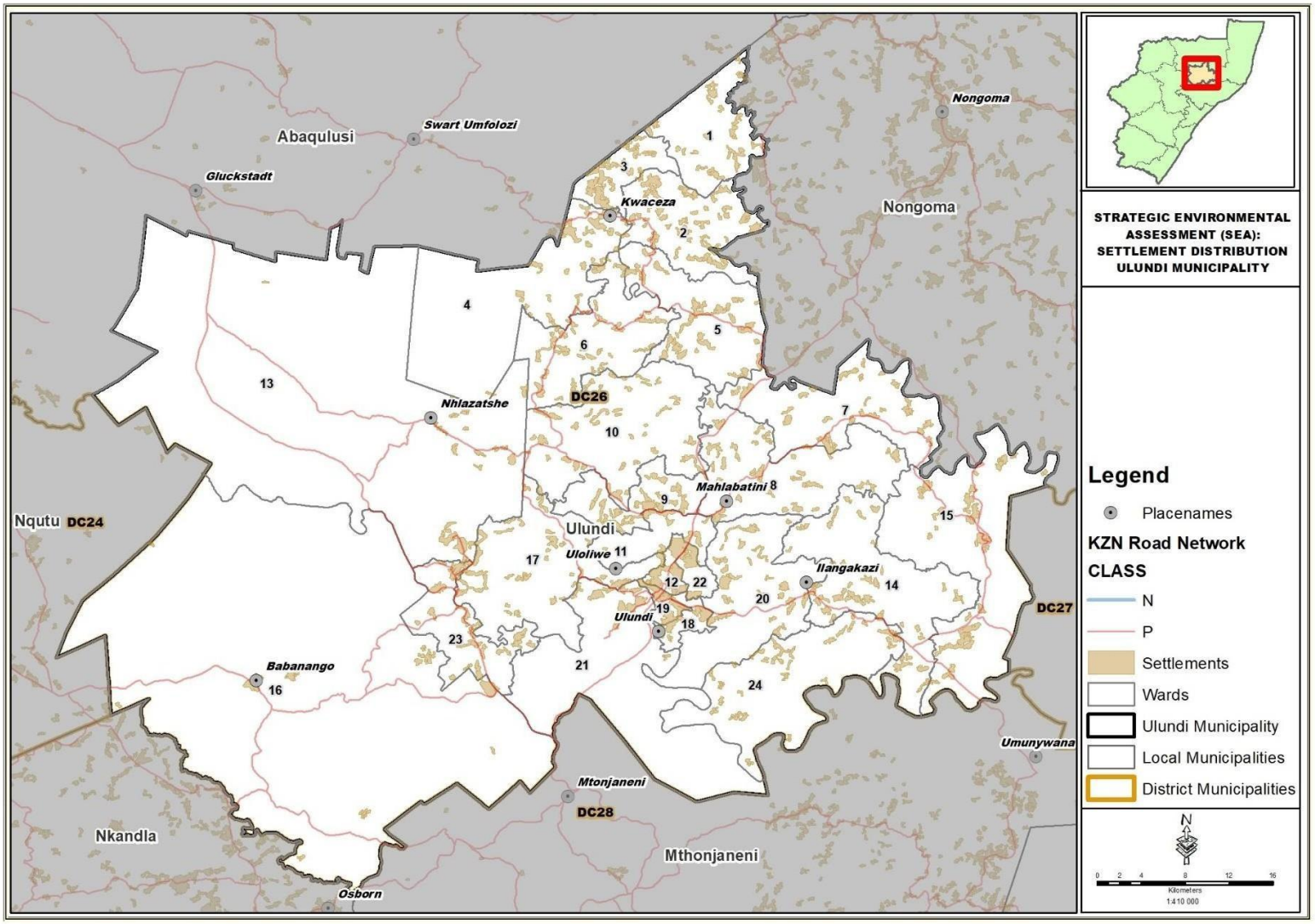


Figure 30: Settlement Distribution

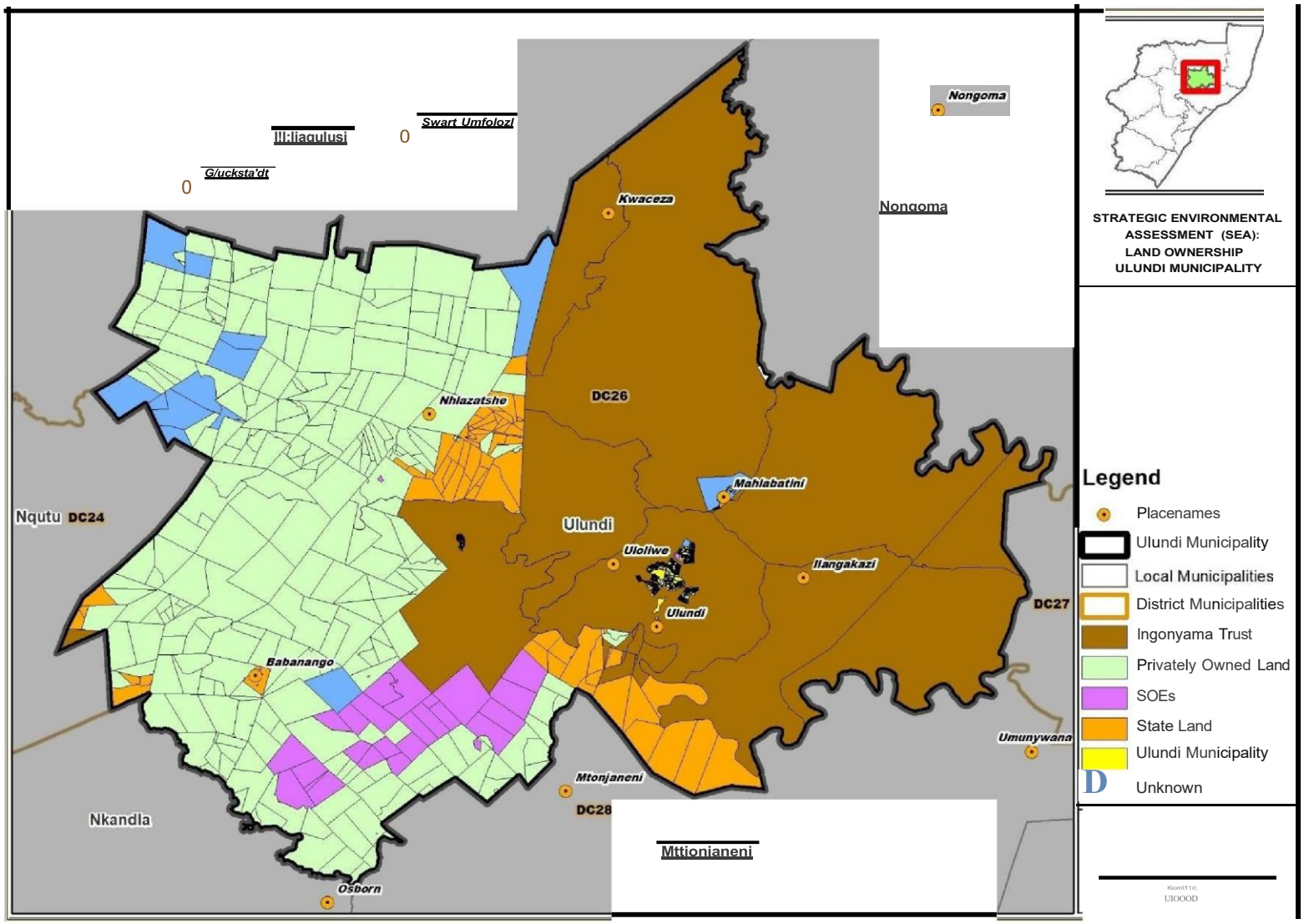


Figure 31: Land Ownership

8.3 Corridors

According to the Ulundi Local Municipality SDF, the corridors are the main structures that hold the spatial framework in place. The corridor concept has recently become popular in provincial development planning and national spatial development planning as the notion of corridor development is providing a useful framework for regional development. The idea of the corridor essentially refers to the development along major roads with considerable existing or potential movement. This inevitably occurs along routes, which connect major 'attractors' – significant towns, tourism attractions and other movement, which generate economic activity.

The corridor is effective in linking infrastructure and economic development as towns and structures are connected to each other via the transport network like "beads on a string". A major objective behind the corridors in this study is the generation of sustainable economic growth and development in relatively underdeveloped areas, according to the inherent economic potential of the locality.

The Movement Corridors linking the primary nodes, hubs, secondary nodes and satellites were proposed as follows:

- Primary Corridor:
- Secondary Corridor:
- Tertiary Corridors:

Influenced by the Economic activities land use patterns and the Tertiary Sector nodal areas, a number of corridors were identified and proposed that can make significant improvement to accessibility of certain areas which in turn will lure potential investments to these areas. A tourism corridor, traversing Ulundi in a northern south and east west direction has been identified.

8.4 Transportation network

The Ulundi Municipality is traversed by two corridors namely the R34 and the R66 routes. The R34 is the main transport link road between Richards Bay and Mpumalanga. The R66 on the other hand provides regional access within the Zululand District Municipality. Ulundi is situated at the north-western end of the

P700 corridor which links Ulundi to Richards Bay, Empangeni, Ntambanana and the Hluhluwe Mfolozi Park which presents further opportunities for tourism development.

This route will provide a shorter travel distance to the Park from Gauteng and Mpumalanga. In addition, the P700 and the P701 provide access to a number of lower order nodes. The construction and rehabilitation of roads within the Ulundi Municipality was identified as a high priority in the compilation of a Comprehensive Infrastructure Plan (CIP) for the Municipality

There is a freight railway line traverses the Municipal area in an east west direction stretching from Ngongweni in the west, via Ulundi to Ngqolothi in the east.

8.5 Assessment of the LM's SDF in Terms of the Sustainability Criteria

The Sustainability Framework dealt with Phase 3 and 4 of the project has been used as the basis for assessment of the current SDF. In the future revision of the SDF, the key issues and Sustainability Framework should be used to guide planers in what environmental components to include in the planning process. The following assessment is based on the Sustainability Framework format and indicates level of inclusion for criteria on the basis of the following:

- Yes – the issue has been dealt with;
- Partially - the issue has not been dealt with;
- Limited – the issue has only been dealt with on a limited basis, and
- No - the issue has been dealt with.

Table 17: NDSS 1 Strategic Priority 1 : Enhancing Systems for integrated planning and implementation.

Strategic Issues	Limited capacity and systems for integrated planning and implementation to achieve sustainable development	**Integration into Ulundi SDF**
Sustainability Objective	Enhanced and effective environmental governance, institutional structures and systems to achieve integrated planning and implementation	
Sustainability criteria	Environmental sustainability criteria are integrated into policies, plans and projects and decision making	Partially
	Cooperative environmental governance structures and mechanisms promote integrated planning and ensure efficient and effective implementation of environmental functions and responsibilities	No
	Financial resources and capacity enable the implementation and management of environmental functions and responsibilities	Partially
	Municipal capital investment projects comply with relevant environmental legislative requirements	Partially
	Communities are informed, empowered and involved in the process of democratic environmental governance	No
	Access to environmental information is facilitated and encouraged	Partially
	Monitoring and evaluation systems assess and report on the progress towards sustainability	No

Table 18: NDSS 2 Strategic Priority 2: Sustaining our ecosystem and using natural resources efficiently

Strategic Issues	The degradation of land and natural resources	Integration into Ulundi SDF
Sustainability Objective	The use of natural capital is compatible with the maintenance of ecosystem functionality and natural resources are protected and restored	
Sustainability Criteria	Areas identified as being essential for the persistence of biodiversity and for the provision of ecosystem goods and services are valued, protected and continually enhanced	Partially
	Degraded areas identified, rehabilitated and managed to promote land productivity	No
	High potential agricultural land is protected and rehabilitated for sustainable agricultural production	Partially
	Agricultural production is enhanced and increased through environmentally sustainable agricultural practices	Partially
	Areas of geotechnical, geology or instability risks are identified and avoided in land development	No
	Compact land and development patterns use land efficiently	Partially

Strategic Issues	Excessive water demand exceeds available supply	Integration into Ulundi SDF
Sustainability Objective	The ability of hydrological features to provide water is maintained within the limits of sustainability	
Sustainability Criteria	Wetland areas, streams and rivers are protected, rehabilitated and managed to maintain ecological functioning	No
	Flood prone areas are managed to promote ecosystem goods and services, to minimise flood risks and impacts	No
	Water demand management results in minimised water loss and optimised water conservation	No
	Everyone has access to minimum supplies of potable water needed to maintain their health and well-being	Partially
	Catchment and river management policies and guidelines integrated into land use and development planning	No
	Equitable and fair access to water supplies is provided from all water users	Partially

Table 1: NDSS 3 Strategic Priority 3: Towards a green economy

Strategic Issues	Economic growth that is not linked to sustainable resource use and environmental impact	Integration into Ulundi SDF
Sustainability Objective	Economic goals based on ecological sustainability and built on a culture that recognises that the socio-economic systems are dependent and embedded in ecosystems	
Sustainability Criteria	An environmentally sustainable economy promotes distributional equity, is resource efficient and provides for the rehabilitation and sustainability	No
	A low carbon economy that relies on clean, renewable and efficient energy sources and transport options	No
	A resource efficient economy that optimises its use of water while significantly reducing waste generation	No
	An equitable and broad range of employment opportunities exist that provide people with an income to support themselves and their families	Partially

Table 19: NDSS 4 Strategic Priority 4: Building sustainable communities

Strategic Issues	Inefficient spatial planning and urban design and inadequate provision of basic services	Integration into Ulundi SDF
Sustainability Objective	Environmentally sustainable communities are established where development is informed by social needs and the improvement of the quality of life and does not compromise the natural environment	
Sustainability Criteria	Environmental sustainability and ecosystem goods and services are integrated into development planning	Partially
	Sustainable infrastructure and services are available, maintained and managed to sustainably meet the needs of the residents and businesses	Partially
	All residents have appropriate, secure and affordable housing and access to basic services in order to meet their basic needs and live with dignity	Partially
	Communities vulnerable to environmental risk are identified and strategies are in place to minimise these risks	No
	Environmental justice and equity must be pursued so as to ensure that environmental impacts do not unfairly discriminate against any person or community	No
	Community services, facilities, community parks	No

	and open spaces are accessible to all people.	
	An efficient, safe, integrated and convenient network of public transport, bicycle routes and pedestrian access is provided.	Partially
	Safe, clean and pleasant environments are provided to protect and enhance human health and well-being and improved overall quality of life.	Limited
	Resources use is minimised through energy efficiency, reduced water demand, efficient waste management and the provision of accessible public transport	No
	Natural resources and sense of place are protected and maintained	Partially

Table 20: NDSS 5 Strategic Priority 5: Responding effectively to Climate Change

Strategic Issues	Greenhouse gas contributing to climate change	Integration into Ulundi SDF
Sustainability Objective	Air quality being improved	
	Reduce greenhouse gas concentration	
	Building resilience to climate change within communities and ecosystem	
Sustainability Criteria	Ambient air quality standards for the protection of human and well-being and natural systems	No
	A low carbon economy is achieved through energy efficiency, the use of alternative technology and reducing dependency on fossil fuels	Partially
	Greenhouse gas emissions are reduced to the level in line with the national approved targets	No
	Natural systems are restored and maintained to be suitable for the sequestration of carbon and mitigate climate change	No
	Climate change adaptation strategies effectively build and sustain social, economic and environmental resilience to climate change	No

9. Governance

Ulundi LM has many role-players that collectively influence and determine the state of the environment within the municipal jurisdiction. The section will identify key role players with a significant role to play in environmental management and decision making at the three levels of the government (national, provincial and local) which will be facilitated by Ulundi LM. Each role player fulfils a specific duty with regards to the critical environmental issues and features within Ulundi LM. The role-players comprise of:

- National, Provincial and Local Government;
- Traditional Authorities; and
- Civil Society Groups.

The legal framework also assists in identifying mandated parties with regulatory functions in the environmental management field. There are three legislative mechanisms that exist at a national level that afford protection to the environment:

1) The constitutional entrenchment of environmental protection through either a rights-based or regulatory approach in the Constitution
2) The environmental protection through framework legislation, namely NEMA
3) Adoptions of specific environmental legislation that covers a range of environmental themes.

The effective management of the biophysical, social and economic environment relies upon sound environmental governance which makes environmental governance a 'cross-cutting' theme. Although different role players are contributing in the development of the Ulundi SEA but the responsibility for the implementation of the SEA rests with Ulundi LM.

9.1 Intergovernmental Cooperation

It is understood that, as far as the environmental management issues are concerned, the municipality has good working relations with the Department of Environmental Affairs (DEA) through the Local Government Support Structure, Department of Economic Development, Tourism and Environmental Affairs (EDTEA) and Ezemvelo KZN Wildlife. It is, however, not clear how the general public and traditional leaders are involved within environmental governance.

9.2 Efficiency and effectiveness

Ulundi Local Municipality has limited ability to respond to opportunities provided by organs of state in terms of improving environmental integration and alignment. There is weak integration of environmental considerations in key municipal instruments such as SDF. The extent to which critical environmental issues are considered by all of the LM's functionality units and executive committees is unknown. There are resources at Ulundi that are responsible for the environmental related functions at the municipality.

9.3 Information sharing

There is lack of adequate information to inform environmental decisions within the LM and the LM's website does not share any critical environmental information.

9.4 Participation in Environmental Governance

Council has created opportunities for the communities to participate in its affairs through the IDP process. However, the environmental participation in the IDP process is not known i.e. there has not been sufficient capacity building to allow for effective participation in the environmental decision making and there is no environmental communication strategy. There is no structure/forum to promote the community's participation in environmental decision making.

9.5 National Environmental Management: Protected Areas Act No. 57 of 2003

This Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It provides for the establishment of national register of all national, provincial and local protected areas and for their management in accordance with national norms and standards.

It provides for cooperative governance in the declaration and management of protected areas. It gives effect to the national system of protected areas as part of a strategy to manage and conserve biodiversity. It provides for representative network of protected areas on state land, private land and communal land. It further promotes participation of local communities in the management of protected areas, where appropriate.

9.6 National Environment Management: Biodiversity Act No. 10 of 2004

The National Environmental Management: Biodiversity Act (NEMBA) provides for management and conservation of biodiversity in South Africa within the framework of NEMA. It provides for the determination of geographical regions as bioregions and publication of bioregional plans. It makes provision for the development of the Biodiversity Sector Plan of which it was developed for Zululand District and approved by Ezemvelo KZN Wildlife in 2015. Furthermore, NEMBA provides for the protection of ecosystem that are threatened or in need of protection to ensure the maintenance of their ecological integrity. Protection of the species that are threatened or in need of protection to ensure their survival has also been provided for in this Act.

9.7 National Environment Management: Air Quality Act No. 39 of 2004

This act aims at regulating air quality to protect the environment by providing reasonable measures for prevention of pollution and ecological degradation and for securing ecological sustainable development while promoting justifiable economics and social development. It allows the municipality in terms of by-laws to:

(a) Identify substances or mixture of substances in ambient air which, through ambient concentrations, bioaccumulation, deposition or any other way present a threat to health, well-being or the environment in the municipality or which the municipality reasonably believes present such a threat, and

(b) In respect of each of those substances or mixtures of substances, establish local standards for emissions from point, non-point or mobile sources in the municipality.

9.8 National Environmental Management: Waste Act No 59 of 2008

The objectives of the Waste Act are to:

(a) To protect health, well-being and the environment by providing reasonable measures for

- (i) Minimising the consumption of natural resources;
- (ii) Avoiding and minimising the generation of waste;
- (iii) Reducing, re-using, recycling and recovering waste;
- (iv) Treating and safely disposing of waste as a last resort;
- (v) Preventing pollution and ecological degradation;

(vi) Securing ecologically sustainable development while promoting justifiable economic and social development.

(vii) Promoting and ensuring the effective delivery of waste services;

(viii) Remediating land where contamination presents, or may present significant risk of harm to health or the environment; and

(ix) Achieving integrated waste management reporting and planning.

(b) To ensure that people are aware of the impact of waste on their health, well-being and the environment;

(c) To provide for compliance with measures set out in paragraph (a) and;

(d) Generally, to give effect to section 24 of the Constitution to secure the environment that is not harmful to health and well-being.

The Waste Act indicate that a municipality must exercise its executive authority to deliver waste management services, including waste removal, waste storage disposal services, in a manner that does not conflict national and provincial norms and standards. Furthermore, this act requires that the municipality develops its Integrated Waste Management Plan (IWMP). The Ulundi Municipality has the IWMP which was developed in 2017.

9.9 National Water Act No 36 of 1998

The National Water Act (NWA) aims at ensuring that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which consider amongst other factors:

(a) Meeting the basic human needs of present and future generations;

(b) Promoting equitable access to water;

(c) Redressing the results of past racial and gender discrimination;

(d) Promoting the efficient, sustainable and beneficial use of water in the public interest;

(e) Facilitating social and economic development;

(f) Providing for growing demand for water use;

(g) Protecting aquatic and associated ecosystem and their biological diversity;

(h) Reducing and preventing pollution and degradation of water resources;

(i) Meeting international obligations

(j) Promoting dam safety; and

(k) Managing floods and draughts.

The Act provides guiding principles for water use. According to this Act, water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under general authorisation, or if a responsible authority waives the need for a license.

In 2012, nine Catchment Management Agencies (CMAs) which were established in terms of the National Water Act, which were aimed to provide radical changes and strengthen the management of water resources, which is the country's scarce resource; through delegation of water management functions into a catchment level alongside Water Management Area (WMA) boundaries. Ulundi Municipality falls within Pongola Mtamvuna WMA.

10. Environmental issues, constraints and opportunities

The key findings from the previous phase, the Situational Analysis phase, has informed this section of the document. The key environmental issues and constraints illustrate the pressures that extend on the receiving environment and are summarised as follows:

10.1 Biophysical Environment

Table 21: Biophysical Issues, Constraints and Opportunities

Issues, Constraints and Weakness	Strengths and Opportunities
Topography	
• Rugged Terrain • Scattered settlement pattern • Insufficient road accessibility in the scattered settlement areas • Slope restricts movement and accessibility • Slope increases cost associated with service delivery and maintenance • Reduced potential for agricultural production due to steep slopes. Those areas are susceptible to degradation through soil erosion • Steep slope is sensitive to development impact because water erosion is very high	• Steeper slopes are not easily accessible and therefore are less disturbed. These areas serve as habitat patches and corridors to various species. It also acts as important water catchment areas. • Conducive topography for adventure tourism
Geology	
• Erosion caused by poor land management practices • Slope places direct limitations on development	
Hydrological Features	
• Land where important water resources are located presents constraints to development • Alien invasive species and overall loss of riparian integrity as a consequence of impacting activities and developments within riparian zones • Alien invasive species reduces water quantity and lead to soil erosion which leads to flooding • Unsustainable use of water resources and associated good and services • Pollution of water resources due to sewer leakages • Inadequate sewage infrastructure • Poor operation of wastewater treatment works	• Increased water infrastructure can lead to job creation • Most of the rivers fall into either unmodified/natural category (Grade A) or largely natural (Grade B) classification • Opportunity to involve the community in water management • Wetlands should be protected, and degraded wetlands should be rehabilitated as a priority measure to improve water quality, water flow regulation and habitat provision • Investigation of the potential tourism opportunities along the Black and White Umfolozi Rivers as water resources

• Wetland degradation due to undesirable human activities i.e. cultivation and inappropriate land-use • Drought impacts on water quantity which impacts on service delivery • Droughts threatens agriculture potential • Increased informal and formal developments place pressure on wetlands and other sensitive environments • The presence of large number of rivers. The high volume of water implies that safety of communities also needs to be considered by locating them outside possible flood areas	
Terrestrial Ecology	
• Loss, transformation and degradation of the natural habitat through cultivation, overgrazing, human settlement and alien invasive species resulting in ecosystem degradation and species loss. • Exploitation and unstainable harvesting of natural resources (i.e. overgrazing, medicinal plants and firewood). • Undesirable development patterns that impact on environmental sensitive areas • Capacity to identify the requirements and obligations in terms of NEMA, NEM: BA, NWA, NEM: WA • Invasive species have negative impact on wetland system with displacement of natural species and the excessive utilisation of water resources • Climate change is observed as a pressure with effects such as increased drought, fire and flood risks which have the potential to impact biodiversity	• The District's Biodiversity Sector (2015) is in place • Promote environmental awareness and education • Conservation efforts can be more focused on CBAs and ESAs • Opportunities exist for local economic development that is conservation-orientated within CBAs and ESAs, especially within areas next to Protected Areas (eMakhosini-Ophathe Heritage Park) • Opportunities exist for the local environment, businesses and communities to develop tourism which is environmentally and commercially sustainable. • Drought and fire risk are a constraint to conservation activities and on the local biodiversity • Opportunity for more stewardship programmes
Agricultural potential and soil	
• Unsustainable agricultural practices and management • Over-grazing • Soil degradation caused by poor agricultural practices • The majority of the municipal area has low agriculture potential • Alien plant encroachment	• Agriculture is one of the key economic drivers in the LM • Agriculture has a potential to contribute to the safeguarding of food security, particularly in the rural areas. • The LM to develop and implement an Agri-Plan that is suited to the current context of the LM • Agricultural producers to link with school feeding

• Soil erosion, over grazing and uncontrolled land use in traditional areas • Mainly subsistence farming • Lack of skilled manpower and technical knowledge • Lack of access to markets and transportation • Lack of development and implementation of Agriculture Plan • Youth lack interest in farming • Potential risks posed by climate change are likely to place pressure on the agriculture potential of the LM • Capacity to identify requirements and obligations in terms of NEMA and NWA	scheme, as an attempt to achieve food security • Access to agricultural inputs (i.e. infrastructure, basic utilities such as water and electricity, good quality seeds for agriculture production etc.) • Sustainable agricultural practices that reduce leaching, erosion, compaction and loss of soil structure should be promoted. • Improve access to machinery and equipment for agriculture use • Diversification of agriculture and agri-processing
Air Quality	
• Lack of air quality data • Air quality and pollution are also influenced by domestic burning of wood especially within the rural communities of the LM • Lack of resources and finances to monitor air quality.	• Due to the rural character of the LM, the air quality is generally good as there are limited contaminating sources • The air quality across of the LM is relatively good and this serves as a positive aspect in place marketing efforts and increase tourism competitiveness of the area • Educating communities on the long-term negative effects of vegetation burning practices, to reduce the impacts of vegetation burning on the soil quality, air quality, and biodiversity in the area.

10.2 Economic Environment

Ulundi is identified as one of the high growth or strategic nodes in the district and 'has the potential to become a significant service centre for the poverty nodes located in the largely rural and traditional settlements in neighbouring King Cetshwayo, UMkhanyakude and Umzinyathi district municipalities' (PSEDS, 2017:151-152 cited in Zululand DM, 2020). In terms of competitive advantage, the key economic indicators of the municipality point to advantage in the services, finance and mining and quarrying sectors whilst in terms of employment contribution the services, finance and trade sectors offer competitive advantage.

Issues, Constraints and Weakness	Strengths and Opportunities
• Balancing economic development with environmental protection. Environmental processes delays implementation of development	• Medical plants gardens and commercial cultivation is both a biophysical and economic opportunity
Tourism	
• Lack of new or innovative tourism attractions • Poor general local tourism awareness • Lack of good road infrastructure in rural areas reducing the number of people accessing the area and tourism sites. The infrastructure development is needed to ensure that the LM is appealing to tourists • The LM is competing with other major attractions within the province, outside the district such as the iSimangaliso Wetland Park • The lack of investment in this sector • Lack of sufficient tourism supporting infrastructure	• The LM has agricultural potential. This can be balanced with conservation based activities and tourism activities • The LM has a rail infrastructure. This strength is currently unrealised but has a huge potential for tourism • The number of flights to Ulundi airport is decreasing. • The development of the Ulundi airport to include flight routes between Ulundi, Durban and Johannesburg to ensure an increased flow of tourists within the LM and district • Tourism can provide an economic argument for the conservation, preservation and restoration of natural and built resources • Youth involvement in tourism projects
Heritage	
• Lack of awareness of what the LM has in terms of cultural heritage assets	• An opportunity lies in the development of the tourism sector to promote the protection of cultural sites while boosting the local economy • An opportunity exists to establish PPPs between various stakeholders to ensure that heritage is preserved and protected and to ensure community empowerment.

10.3 Social Environment

Table 3: Social Issues, Constraints and Opportunities

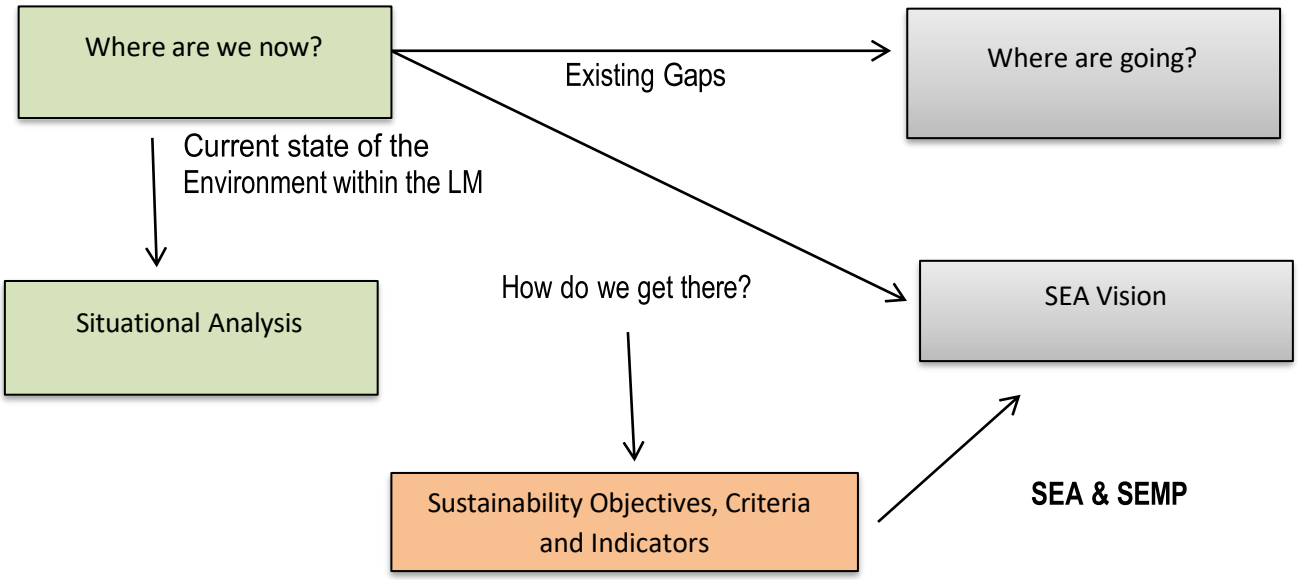
Issues, Constraints and Weakness	Strengths and Opportunities
Demographics	
• High level of unemployment rate • High incident of HIV/AIDS associated with low-income status and lack of access to services • Most of the pupils in the rural areas travel long distances to access educational facilities. The inaccessibility of schools results in low attendance rates that contribute to the poor	• Opportunity to develop agricultural activities to increase the employment rate

educational standards in rural areas	
Provision of basic services	
• Services backlog • Rural scattered very low-density settlements. This settlement pattern has significant implications for development and service delivery throughout the LM • Expensive service delivery as a result of the majority of households located in isolated rural settlements • Waste management related challenges • The majority of households still rely on their own or communal refuse dump due to poor refuse removal	• Improved service delivery • Improved infrastructure and support services directed at agriculture and tourism
Other factors for consideration	
• Limited understanding of environmental issues by land owners, municipal officials and developers result in apathy and lack of awareness for environmental and planning controls and therefore result in inappropriate and unsustainable development	

11. Desired state

The Desired State of the Environment within the context of the SEA is that which is required to ensure that society and the economy within the Ulundi LM is positioned in a way that is within the threshold of sustainability as determined by the capacity of the natural capital to deliver the crucial natural life support systems necessary to sustain both of these components. The Desired State has been developed in a format of Sustainability Framework which the LM can use to assess the sustainability of all PPP in the future.

11.1 Vision



11.2 Vision for Ulundi LM IDP

The Municipality's Vision

"A developmental city of heritage focusing on good governance, socio-economic development and upholding tradition to promote sustainable service delivery".

11.2.1 Vision for SEA

A development city of heritage focusing on sustainable development while upholding tradition

11.3 Desired State per Environmental Feature

11.3.1 Topography and slope

Feature status

The LM demonstrates a steep topography with an elevation of 1600m above the sea level in the western part, 723m above the sea level within the central part and 140m above the sea level within the eastern part of boundary of the municipality. The terrain is rugged with most settlements located dispersed in evenly sloped areas. The slope categories range from smaller than 1:10 (10% incline), 1:6 (17% incline) and 1:3 (33% incline) and steeper. The greater the gradient (1:6 – 1:3), the more difficult and more expensive construction and provision of services become.

Desired State

The LM must adopt a sustainable approach to human settlements with appropriate service levels and strategies for addressing the needs of scattered settlements and the more densely populated rural areas, in order to ensure sustainable infrastructure planning and alignment. In some instances, alternative methods of providing usual services and infrastructure must be explored, particularly in rural, such as the provision of water tanks for rainwater harvesting.

11.3.2 Geology

Feature status

The geology and soils occurring at Ulundi LM can be summarised as follows:

- Dolerite – are mostly found in the north-western parts of the LM
- Ecca Group – it mostly dominates the western parts of the LM with small patches found in northern part
- Greenstone - it is found almost is patches throughout the LM

- Natal Group – it is mostly found in southern parts of the LM
- Quartzite - it is found in the north-western parts of the LM
- Shale – it is found in the north and southern parts of the LM

Desired State

While no desired state could be provided because the underlying geology cannot be changed, cognisance of the underlying geology should be taken into consideration when planning for development within the LM and appropriate engineering solutions must be used where the underlying geology is deemed unsuitable for the proposed development.

11.3.3 Hydrological Features

Feature status

The White and Black uMfolozi Rivers are the main river systems of the local municipality with sources from outside ULM boundaries, approximately 18 km north-west of Vryheid and 26 km east of Vryheid respectively. The main tributaries of the Black uMfolozi River within ULM are iThaka, Vungu, Mbhekamuzi, Matiyamba and Zoma Rivers. Whereas the main tributaries of White uMfolozi River within ULM are Mvutshini, Nhlebela, Mpathe, Nhlazatshe, Maphophoma, Mkumbane, Mthibelundi, Nkunzana, Ndlovane, Demaneni and Nhlungwane Rivers. Various other small tributaries drain into these major tributaries, which subsequently discharge into the White uMfolozi River. The White uMfolozi River flows in a west to south easterly direction and confluences with the Black uMfolozi River in the Hluhluwe-Mfolozi Park becoming the uMfolozi River and subsequently discharges into the Indian Ocean in the east, just north of Richards Bay. In Ulundi LM, there is one free flowing river, Black Umfolozi River. It is is one of the 4 flagship free flowing rivers identified in KZN.

There are a number of wetland systems distributed throughout the Ulundi LM. Wetlands are important natural asset and provide a number of ecosystem services such as flood control, nutrient cycling, stream flow regulation and erosion control. In the Ulundi LM, some of the wetlands are degraded due to various reasons ranging from cultivation, poor grazing, disruption of freshwater flows, pollutants (WWTW, urban run-off, runoff from illegal waste dumps) and alien invasive species.

Desired State

- Rehabilitation of wetlands should be actively encouraged and programmes initiated in that regard
- Future developments should be excluded from flood lines and designed to minimise potential impacts to water resources through appropriate mitigation measures (i.e. establishment of suitable buffer zones).
- Strom water management should be integrated into existing and future development designs to prevent further flood risks and impacts to aquatic resources.
- Avoided blocked and leaking sewer system should be ensured
- Avoided contaminated storm water systems
- Addressed illegal and inappropriate waste disposal into rivers, streams, wetlands and stormwater systems
- Improved aesthetic value of water sources
- Reduction in water excess use (wastage)
- Recycling used water
- Achieving equitable and sustainable water supply and water use (improvement water access to the municipal areas that are currently without access to water).

In terms of climate change, the key impacts on water resources can include:

- Air and water temperature increases
- Changes in levels and distribution of rainfall
- Storm intensity increases
- Changes in run-off (patterns, volumes etc.)

The impact of climate change on the hydrological features of the study area can only be determined through a detailed Vulnerability and Assessment Study which should be aligned to the existing Zululand DM's Climate Change Response and Adaptation Strategy. Such a study is recommended for the LM since the study will also provide adaptation and mitigation measures.

11.3.4 Terrestrial Ecology

Feature status

There are eighteen vegetation types found within the Ulundi LM. High levels of transformation in the study have contributed to the some of the vegetation being considered as being threatened. The following threatened ecosystems are vulnerable:

- Eastern Scarp Forest
- Imfolosi Savanna and Sourveld
- Low Escarpment Mistbelt Forest
- Midlands Mistbelt Grassland
- Ngongoni Veld

In terms of critically biodiversity areas, the areas of conservation concern in this municipality are as follows:

- The Critical Biodiversity Areas (Irreplaceable) are mostly concentrated in the east, where Ulundi borders on the Hluhluwe Mfolozi Game Reserve. A limited number of small pockets are scattered on the western parts of the municipality. They are situated in close proximity to the areas of Babanango, Nhlazatshe and Mahlabathini. There are other smaller pockets located between the areas of Uloliwe and KwaMbambo.
- The critical biodiversity areas: optimal are concentrated mainly in the western parts of the municipality.
- The ESAs are mostly concentrated on the south-western parts of Ulundi LM. There are other pockets of the ESAs species found on the north-eastern and south-eastern part of Ulundi LM.

The Ulundi LM has number of environmental sensitive areas, of which some areas are already formally protected. The Emakhosini Ophathe Heritage Park and Game reserve is located on the southern boundary of the municipality directly south of the White Mfolozi River. There is also one Stewardship area which is located to the west of Babanango area

Desired State

The SEA should be widely disseminated so that it can inform all development planning processes within the LM. Given the levels of transformation in the LM and pressures on the remaining land, efforts are urgently required to secure and manage CBAs. The following responses are recommended in this regard:

- Work closely with the traditional authorities, the Ingonyama Trust Board and other supportive government departments to find ways to integrate biodiversity conservation into decision making (e.g. land allocation within rural areas).
- Improve law enforcement, particulty in case of illegal activities.

While degraded areas are not necessary areas of highest biodiversity value, there are, however, threats to CBAs. A range of action can support rehabilitation efforts including:

- Preparing and implementation of an alien invasive species monitoring, control and eradication plan
- Supporting and promoting broader alien invasive clearing in conjunction with local landowners and Working for Water
- Implement a Land Care initiative aimed at rehabilitating degraded lands to either be productive for agricultural use or enhancing their biodiversity value
- Capacity building and empowerment, particularly in rural areas where overgrazing is a concern

Many species and habitat are already under pressure because of anthropogenic activities. Compounding the effects that these have on biodiversity are the impacts that changing climatic condition will have. It is therefore essential that biodiversity management takes climate change into account.

11.3.4 Agricultural potential and soil

Feature status

Based on the review of available literature on agriculture in the LM, the agriculture sector is the most important economic sector in the Ulundi LM. The LM has a limited number of cultivated areas, with very few pockets of land having high and good agricultural potential. Forestry, sugarcane, sub-tropical fruits and livestock farming is prominent within the municipality however limited processing of these products occurs to diversify and boost the local economy.

Given the importance of agriculture in the LM, there is diversity of agricultural activities and therefore a diversity of agricultural issues and opportunities.Some of the factors that have the ability to impede the sustainable growth and development agriculture sector in Ulundi LM include, inter alia:

- Over exploitation of resources;
- Loss of ecosystem services – flooding, erosion and infrastructure damage;
- Alien plant encroachment;
- Institutional and procedural weaknesses;
- State of rivers
- Soil erosion, over grazing and uncontrolled land use in traditional areas; and
- Uncontrolled urban and rural sprawl;

There are opportunities that exist in Uundi LM with the aim of uplifting households in rural settlements using agriculture. The opportunities include programmes geared towards improving agriculture practices and skills transfer between existing and emerging as well as food security programmes.

Desired State

- The SEA should provide an indication of the areas that could be used for agricultural production in future without further destruction or loss to the remaining ecosystem goods and services derived from the biodiversity of the LM
- In those areas where agriculture has compromised biodiversity (i.e. agricultural production on steep slopes, in river valleys without buffer, wetlands etc.), serious consideration should be given to rehabilitation of those areas
- Land identified for commercial timber production is and should be defined by the Department of Water and Sanitation (DWS) permitting system, which is designed to protect the water production potential of catchments.

It is predicted that climate change is to increase temperatures and rainfall variability as well as decrease water security, which will negatively affect the quantity of agricultural production in the study area. Adoption of climate-smart is likely to be an important adaptation strategy and will improve the readiness of people for changes in climate. The Climate-Smart Agriculture or Conservation Agriculture is defined by Food and Agricultural Organisation as an agriculture that sustainably increases productivity, resilience (adaptation),

reduces/removes Greenhouse Gases (mitigation) and enhances achievement of national food security and developments goals.

Agriculture is fundamental linked to the environment and its natural resources and cannot be viewed in isolation. It is, therefore, a requirement that any institutional systems/departments/plans developed by the LM should work in close conjunction with the environmental planning section.

Implementation of sustainable agriculture practices requires the transfer of knowledge amongst commercial, small-scale and resource poor farmers. Well qualified agriculture personnel /extension officers are required to provide training and knowledge transfer.

11.3.5 Socio-economic

Feature status and desired state

The South African Constitution Act 108 of 1996 section 24, imposes the promotion and protection of the country's natural environment and the rights of South Africans to access an environment that is not harmful to their health or well-being. Section 21 of the Constitution stipulates that everyone has a right to freedom of movement. It states that everyone has a freedom to reside anywhere within South Africa.

- Population Distribution – there has been an increase of population in Ulundi LM between 2011 and 2016. In 2011, the population was 188 585 and in 2016 it increased by 17 177 to 205 762. The population growth rate between 2011 and 2016 was 1.09% per annum. The growing population has the potential to influence the intensity of development. Therefore, the growing population needs to be met with adequate supply of basic services and infrastructure in order to ensure a good quality of life.
- Economic nodes –Ulundi LM has been identified as one of the primary nodes for the Zululand District Municipality since its functions as a driver of the economy within the District. The Ulundi town has been identified as the primary node with the LM. Babanango, Ceza, Mpungamhlophe and Nqulwane have been identified as secondary nodes. The tertiary nodes that have been proposed include Gazini, Ezimfabeni, Dlebe, Nhlazatshe, Mhlahlane, Ntonjeni, Mahlabathini, Zungu, Okhukho, eMkhosini. Activities in the existing and proposed nodes needs to be balanced against

the surrounding land uses i.e. a balance between economic opportunities and residential developments with associated facilities. The development of economic activities should be within the identified nodes.

- Access to basic services –
  - Water - There has been an increase in number of households that have access to piped access to water inside the dwelling or yard, refer to adjacent table. There was a significantly dramatic increase in the supply of piped water in 2016, as 25 822 households had access to piped water. It is also noted that there are still 11 483 households that do not have access to piped water. This provides that there is still room for improvement in the provision of piped water as a basic service delivery output.
  - Sanitation – The most common sanitation facility used in the municipality is the pit latrine (both ventilated and unventilated), which is used by 64,18% of the population, followed by the chemical toilet (15,93%) and the flush toilet (9,86) respectively. It is noted from the data that about 5% of the population still do not have access to sanitation facilities. There should be improvement in provision of sanitation facilities to all communities to provide for improved and a healthier population.
  - Waste Management – the LM has an approved IWMP. There is one transfer station found within the LM. The majority of households, particularly those in the informal and rural areas, do not receive waste management services. These households often use their own dump sites or probably burn waste within their yards which impacts negatively on the sustainability of the environment. The municipality collects waste from urban areas and transport the waste into the transfer station located on a site owned by the Zululand District Municipality but managed by the Ulundi LM. The waste is then transferred to Richards Bay in terms of the service level agreement entered between the LM and the external service provider
- Health facilities - s. In terms of the health facilities, the Ulundi LM is adequately resourced with 26 clinics, 2 hospitals and 6 mobiles. It is recommended that such facilities should be well equipped and capacitated with a clear focus on treatment of, amongst other illness, HIV/AIDS which is one of the wide spreading epidemics. There is a need to decrease the prevalence of this disease but also address the current situation through the provision of access to medical care (i.e. personnel, medication and facilities).

- Disaster Management – in February 2020, the LM reviewed and adopted a Disaster Management Plan which serves as a framework that guides management of disasters within the LM. It is understood that the Ulundi Disaster Management and Fire Services have access to a very limited equipment and with what is available and in working order, only very basic fire brigade incidents can be handled by the LM. The LM is prone to various forms of natural disasters, ranging from fire, severe weather conditions, droughts and lightning. In terms of capacity to address and reduce risks, there is currently a strong emphasis on preparedness and response planning. This means that capacity and planning in terms of mitigation and prevention should be strengthened. There should be improved accessibility, particularly in the rural areas to enable efficient and effective provision of disaster management services.

11.3.6 Air quality

Feature status

There is no Air Quality Management Plan for the Zululand District Municipality. It is, however, assumed that air quality can be negatively affected by various point sources such as:

- Human settlement air pollution, especially in winter
- Vehicle emissions
- Dirt roads (dust)
- Agricultural activities (dust resulting from seasonally exposed or bare soil surfaces, from degraded areas, burning of sugar cane)
- Construction activities (dust)

NO_2 are generally deemed acceptable and within recommended standards. However, as NO_2 is closely linked to vehicle emissions, levels may increase as vehicle use increases. Increased NO_2 possess both a health and environmental risk.

Desired State

- Improved public transport
- Increased accessibility and use of public transport are likely to play an important role in reducing vehicle emissions within the LM, particularly in the Ulundi town and surroundings.
- Development of safe cycle and pedestrian facilities
- Refraining from having unvegetated open spaces
- Increased number of households with access to electricity

11.4 Sustainability Objectives

According to DEAT (2007), sustainability objectives provide a clear statement of intent and indicate the desired direction to achieve the vision. They also provide a methodological 'yardstick' against which the environmental effects of the SEA can be tested while also guide the SEA process in terms of the level of details and type of information or data that is required. More specifically, sustainability objectives should:

- Focus on the desired outcome;
- Be clear and concise;
- Be of the appropriate scale; and\be compatible with each other.

11.5 Sustainability Criteria for Strategic Assessment

The main outcome of the desired state is the identification of the sustainability criteria against which the municipality can assess all Plans, Programs and Polices that include indicators and targets against which the LM can measure achievement of the sustainability objectives for the environment. This was undertaken in the format of a sustainability framework.

Table 22: NDSS 1 Strategic Priority 1: Enhancing systems for integrated planning and implementation

Strategic Issues	Limited capacity and systems for integrated planning and implementation to achieve sustainable development
Sustainability Objective	Enhanced and effective environmental governance, institutional structures and systems to achieve integrated planning and implementation
Sustainability criteria	Environmental sustainability criteria are integrated into policies, plans and projects and decision making
	Cooperative environmental governance structures and mechanisms promote integrated planning and ensure efficient and effective implementation of environmental functions and responsibilities
	Financial resources and capacity enable the implementation and management of environmental functions and responsibilities
	Municipal capital investment projects comply with relevant environmental legislative requirements
	Communities are informed, empowered and involved in the process of democratic environmental governance
	Access to environmental information is facilitated and encouraged
	Monitoring and evaluation systems assess and report on the progress towards sustainability

Indicators	**Targets**
% of policies, programmes, projects assessed using sustainability appraisal	100% of all policies, programmes and projects approved by the Council
% of LM's budget allocated to environmental mandates	Baseline and targets to be determined
Environmental awareness index	Baseline and targets to be determined
LM's SEA and SEMP	SEA and SEMP to be compiled every five years

Sustainability Strategies
Establish effective cooperative environmental governance structures and institutional mechanisms between key environmental authorities
Integrate the sustainability criteria and environmental sensitivity information of the SEA into all municipal planning
Ensure all LM's projects comply with all relevant environmental legislation, regulations, policies and guidelines
Environmental issues and priorities must be embedded into the Performance Management System and Key Performance Areas of all components of the LM
Develop a monitoring evaluation and reporting mechanism to facilitate continual assessment towards achieving sustainability
Revise and update the SEA and SEMP
Develop and implement a sustainability awareness and environmental capacity building campaign to empower all relevant role players
Develop and implement skills development strategies to promote integrated planning and enhance environmental management
Promote access to environmental information that is easily available to all sectors of the society through various information media
Build capacity in the Environmental section of the LM

Table 23: NDSS 2 Strategic Priority 2: Sustaining our ecosystem and using natural resources efficiently

Strategic Issues	The degradation of land and natural resources
Sustainability Objective	The use of natural capital is compatible with the maintenance of ecosystem functionality and natural resources are protected and restored
Sustainability Criteria	Areas identified as being essential for the persistence of biodiversity and for the provision of ecosystem goods and services are valued, protected and continually enhanced
	Degraded areas identified, rehabilitated and managed to promote land productivity
	High potential agricultural land is protected and rehabilitated for sustainable agricultural production
	Agricultural production is enhanced and increased through environmentally sustainable agricultural practices
	Areas of geotechnical, geology or instability risks are identified and avoided in land development
	Compact land and development patterns use land efficiently

Indicator	**Targets**
% land transformation of areas identified as being essential for the persistence of biodiversity and for the provision of ecosystem goods and services	Not exceeding connectivity thresholds (i.e. 75% of land in identified planning units remain untransformed)
% land transformation of high potential agricultural land to non-agricultural uses	No nett loss

Sustainability Strategies
Sustainability objectives and criteria must be integrated into all relevant policies, programs and plans
Integrate the Zululand District Municipal Biodiversity Sector Plan into all LM spatial and land-use plans
Integrated and coordinated land use management through cooperative structures and strategies
Incentives for sustainable agriculture land management practices that ware within acceptable norms and standards
Implement landcare and rehabilitation (including wetlands, alien species and erosion) projects aimed at green jobs creation and restoring land and natural resources
Develop and implement community based natural resources management strategy

Strategic Issues	Excessive water demand exceeds available supply
Sustainability Objective	The ability of hydrological features to provide water is maintained within the limits of sustainability
Sustainability Criteria	Wetland areas, streams and rivers are protected, rehabilitated and managed to maintain ecological functioning
	Flood prone areas are managed to promote ecosystem goods and services, to minimise flood risks and impacts
	Water demand management results in minimised water loss and optimised water conservation
	Everyone has access to minimum supplies of potable water needed to maintain their health and well-being

	Catchment and river management policies and guidelines integrated into land use and development planning
	Equitable and fair access to water supplies is provided from all water users
Indicator	**Targets**
Municipal water loss %	Less than 15%
Per capita consumption	Consumption < 200l/capita/day
% of household with access to minimum of 75 litres of water supply per person per day	100%
Wetland and riparian are functional loss	No net loss of wetland and riparian functionality
Reduction of water demand	15% reduction
Sustainability Strategies	
The restoration and sustainable management of water catchments	
Policies and measures implemented to significantly reduce levels of water consumption and demand through water use efficiencies	
Determination and maintenance of ecological reserve for key rivers	
Coordinate and integrate strategies and programmes to ensure sustained implementation of alien plant control and rehabilitation	
Coordinate and integrate strategies and programmes for wetland and riparian are rehabilitation	
Implement a water loss and wastage management plan	
Develop policies and strategies for the more efficient and effective management of farm dams and irrigation system	

Table 7: NDSS 3 Strategic Priority 3: Towards a green economy

Strategic Issues	Economic growth that is not linked to sustainable resource use and environmental impact
Sustainability Objective	Economic goals based on ecological sustainability and built on a culture that recognises that the socio-economic systems are dependent on embedded in ecosystems
Sustainability Criteria	An environmentally sustainable economy promotes distributional equity, is resource efficient and provides for the rehabilitation and sustainable
	A low carbon economy that relies on clean, renewable and efficient energy sources and transport options
	A resource efficient economy that optimises its use of water while significantly reducing waste generation
	An equitable and broad range of employment opportunities exist that provide people with an income to support themselves and their families
Indicators	**Targets**
Unemployment rate	< 5% of economically active people
Number of green jobs created within the LM	1000
Number of green technology businesses established within the LM	20
Sustainability Strategies	
Develop and implement a green economy strategy and programmes for the LM	
Implement skills development in the green economy sector	
Develop incentives for the production of environmentally friendly products	

Implement programmes to ensure the rehabilitation and sustainable management of natural assets and ecosystem services
Create opportunities for training and job creation in green economy programmes (carbon sequestration, rehabilitation of degraded areas, waste management and recycling, urban greening, alien invasive species management).
Promote self-sufficient, food security and sustainable livelihoods

Table 24: NDSS 4 Strategic Priority 4: Building sustainable communities

Strategic Issues	Inefficient spatial planning and urban design and inadequate provision of basic services
Sustainability Objective	Environmentally sustainable communities are established where development is informed by social needs and the improvement of the quality of life and does not compromise the natural environment
Sustainability Criteria	Environmental sustainability and ecosystem goods and services are integrated into development planning
	Sustainable infrastructure and services are available, maintained and managed to sustainably meet the needs of the residents and businesses
	All residents have appropriate, secure and affordable housing and access to basic services in order to meet their basic needs and live with dignity
	Communities vulnerable to environmental risk are identified and strategies are in place to minimise these risks
	Environmental justice and equity must be pursued so as to ensure that environmental impacts do not unfairly discriminate against any person or community
	Community services, facilities, community parks and open spaces are accessible to all people.
	An efficient, safe, integrated and convenient network of public transport, bicycle routes and pedestrian access is provided.
	Safe, clean and pleasant environments are provided to protect and enhance human health and well-being and improved overall quality of life.
	Resource use is minimised through energy efficiency, reduced water demand, efficient waste management and the provision of accessible public transport
	Natural resources and sense of place are protected and maintained

Indicator	**Targets**
Domestic waste collection standards	100 % adherence to standards for levels of service, waste collection and recycling centres
% of households with access to sufficient, clean potable water	100%
% of households with sanitation to MIG standards	100%
% of households with a source of electrical supply	100%

Sustainability Strategies
Sustainability objectives and criteria must be integrated into all relevant polies, programmes and plans, particularly LM's spatial and land-use plans
Fast track the equitable and universal access to acceptable standards of basic services
Undertake municipal infrastructure capacity and status assessments and implement upgrade and maintenance interventions to ensure the provision of sustainable services
Undertake environmental vulnerability assessment to identify communities at risk and develop appropriate strategies to minimise risks and promote human well-being
Green design policies and standards are developed for spatial planning and developments in order to promote environmental efficiency and minimise use of resources
Develop and implement IWMP that meet and exceeds the standards by the National Waste Management Strategy and Waste Collection Standards

Table 25: NDSS 5 Strategic Priority 5: Responding effectively to Climate Change

Strategic Issues	Greenhouse gas contributing to climate change
Sustainability Objective	Air quality being improved
	Reduce greenhouse gas concentration
	Building resilience to climate change within communities and ecosystem
Sustainability Criteria	Ambient air quality standards for the protection of human and well-being and natural systems
	A low carbon economy is achieved through energy efficiency, the use of alternative technology and reducing dependency on fossil fuels
	Greenhouse gas emissions are reduced to the level inline with the national approved targets
	Natural systems are restored and maintained to be suitable for the sequestration of carbon and mitigate climate change
	Climate change adaptation strategies effectively build and sustain social, economic and environmental resilience to climate change

Indicators	Targets
Ambient air quality monitoring of Nitrogen dioxide (NO_2), Sulphur Dioxide (SO_2) and particulate matter smaller than ten microns in size (MP_{10}).	No exceedance of ambient air quality standards
% reduction in Greenhouse gas emissions	To be in-line with the South African ambient air quality standards
% of households with access to electricity	100%
Units of energy saved through energy efficient interventions	Targets to be established

Sustainability Strategies
Promote efficient public transport
Develop and implement a Climate Change Response and Adaptation Strategy
Update and implement the Disaster Management Plan to include pro-active response to climate change
Restore and maintain indigenous plants, forests and other areas suitable for sequestration of carbon
Promote urban greening initiatives for the role it plays in mitigating air pollution and in carbon sequestration
Reduce household indoor combustion of woods and coal by increasing access to electricity

Develop and implement increased standards for design specifications for key infrastructure to cater for extreme weather conditions
Develop incentives for energy efficient and air pollution reduction

12. Action Plans

The strategies have been developed in order to assist the Ulundi LM to achieve the Desired State of the Environment and sustainable development. The action plans are intended to be operationalised through the IDP and have been structured accordingly. The timeframe indicated relate to the *5 year* review period for the SEA and therefore short term refers to tasks to be undertaken in the first year of implementation. Medium term refers to tasks that would be undertaken in the second year of implementation and extend into third year. Long term refers to tasks that should be undertaken in the third and fourth years of implementation and be completed by the review of the SEA in 2026.

Allocation plans included in this section are the responsibility of Ulundi LM, however, strategic partners that may have assist the LM in implementation of the action plans have been identified. Where possible estimated budgets have been indicated for each tasks included in the action plans. In some cases, it is expected that the LM should have the capacity in-house to implement some of the action plans.

12.1 Biophysical

The key findings from the Situational Analysis Phase show that some of the hydrological features i.e. rivers and wetlands are degraded. Water pollution sources arise from various sources including, faecal pollution, and dumping of waste illegal on water resources. These sources pollution threatens the integrity and functionality of water resources within the Ulundi Local Municipality thereby threatening the critical biodiversity areas and ecological support areas within Ulundi LM. Alternative pollution sources include sedimentation from erosion and poor storm water management. Buffers surrounding wetlands are critical for the management of water resources. They serve to maintain and improve the ecological functioning of wetlands in close proximity to disturbances within the catchment area. Although the Zululand District Municipality is the water authority which provides and distributes water, it is however, the responsibility of Ulundi to ensure that the integrity of the water resources within their area of jurisdiction is not compromised.

Water resources in any catchment are largely depended on rainfall. Climate change is predicted to have an impact on rainfall patterns in South Africa, so as in Ulundi LM. Water scarcity, in the form of draught can be mitigated if the water resources are maintained within the limits of sustainability. Wetland areas, streams and rivers should be protected, rehabilitated and managed to maintain their ecological functioning. Water security for vulnerable communities should be addressed through residential planning designs of government funded housing, such as rain water harvesting, reuse of grey water, etc. Alien clearing along watercourses will assist by providing improved sustainable water resources.

Change in land cover is the greatest driver of biodiversity loss. These changes not only fragment landscape but alter biogeochemical cycles, climate, ecosystem processes and ecosystem resilience, thereby changing the nature of ecosystem services provision and human dependencies. These losses and changes pose significant challenges for meeting biodiversity conservation goals and targets. Overcrowding, poverty and poor farming practise are amongst other reasons have led to loss of significant areas of good agricultural land and land degradation is now regarded as one of the challenges facing rural areas within the Ulundi LM. The municipality should identify degraded areas and rehabilitate them in order to promote land productivity.

Table 26: Action Plan for River and Wetland Assessment

B1: River and Wetland Assessment			
Strategic Outcome/Positive spin-offs	• Improve water quality and quantity • Maintenance of biodiversity and associated ecosystem goods and services	**Strategic Objectives**	• Ensure that the quality of water from rivers, streams and wetlands is suitable for maintenance of biodiversity and protection of human well-being
Issues Addressed	• Land degradation and solid waste and storm water management impact on water • Loss of ecosystem goods and services and associated biodiversity results in a decline in social and economic conditions	**Responsible Organization/s**	• Ulundi LM - Environmental Unit, Housing and Planning Unit, Project Management Unit & Community Development • Zululand District Municipality
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Continual update wetlands mapping as new information becomes available	Ongoing	DWS	In-house (Environmental and GIS Units)
Determining wetland and river buffers	Ongoing	DWS	In-house (Environmental Unit)
Undertake a wetland and river functionality assessment	Medium term	DWS & Zululand District	R20 000
Rehabilitation of prioritized wetlands	Ongoing	DWS & DEFF	R50 000
Develop and administer community awareness program that communicates the value of ecosystem goods and services to communities that neighbor wetlands and rivers.	Medium terms/ongoing	DWS & Zululand District	R20 000

Table 27: Action Plan for Land Degradation

B2: Land Degradation Plan			
Strategic Outcome / Positive spin-offs	• Reduced land degradation, maintain and improve ecosystem goods and services and thereby creating more opportunities for economic and social development	**Strategic Objectives**	• To preserve the LM's biodiversity and minimize the loss of species resulting from proposed developments • Ensure that the quality of water from rivers, streams and wetlands is suitable for maintenance of biodiversity and protection of human well-being
Issues Addressed	• Inappropriate land use results in land degradation, the loss of agricultural productive land and natural resources • The loss of ecosystem goods and services and associated biodiversity results in a decline in social and economic conditions	**Responsible Organization/s**	• Ulundi LM - Environmental Unit, Housing and Planning Unit, Project Management Unit, GIS & Community Development
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Identify and map areas of degraded land	Short term	DARD	In-house (Environment and GIS Units)
Implement soil erosion control measures including rehabilitation with local indigenous plants	Ongoing		R20,000.00 per annum
Prioritize degraded areas in need of rehabilitation	Medium term		R20 000
Rehabilitation priority areas using hydro seeding and any other potential rehabilitation methods recommended. Species to be used in rehabilitation should as far as possible use local indigenous species	Ongoing		R20,000.00

Provide community training and extension services to prevent land degradation and unsustainable agriculture practices	Ongoing		R10 000

Table 28: Action Plan for developing the Alien invasive Clearing Program

B3: Alien Invasive Clearing Program			
Strategic Outcome/Positive spin-offs	• Reduce land degradation • Increase water availability • Increase area for grazing land • Create employment opportunities	**Strategic Objectives**	• To manage inappropriate land use to limit land degradation and loss of agricultural potential, ecosystem goods and services and associated biodiversity
Issues Addressed	• Alien plants infestation results in land degradation, the loss of agricultural productive land and natural resources and the loss of ecosystem goods and service and associated biodiversity which result in decline in social and economic conditions	**Responsible Organization/s**	• Ulundi LM - Environmental Unit, GIS & Community Development
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Update alien plant mapping	Short term	EDTEA,DEFF,Ezemvelo & Working for Water	R10,000.00
Prioritize areas in terms of the extent of the invasion and the area plays in ecological functioning	Short term		R15,000.00
Implement alien plant clearing and control	Medium term		R20 000
Carry out follow-up inspections to ensure re-invasion does not occur. Include consideration of using local indigenous vegetation for rehabilitation of cleared areas.	Ongoing		Inhouse

Develop and administer an alien invasive plant awareness campaign	Ongoing		In house

Table 29: Action to undertake the climate change vulnerability assessment, response and adaptation strategy

B4: Climate Change Vulnerability Assessment, Response and Adaptation Strategy			
Strategic Outcome / Positive spin-offs	• Reduce Ulundi LM's vulnerability to climate change impacts	**Strategic Objectives**	• Improve air quality • Build resilience to climate change within communities and ecosystem
Issues Addressed	Risk of climate change and potential impacts to ecosystem service delivery	**Responsible Organization/s**	Ulundi LM - Environmental Unit, Disaster Management Unit & Community Development
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Customize the vulnerability assessment undertaken for the Zululand District to address Ulundi LM's context	Short term	EDTEA, DEA, DARD, DWS, Ezemvelo KZN Wildlife & Zululand District Municipality	In-house
Develop adaptation and mitigation measures	Short term		Inhouse
Develop and Implement the Climate Change Response and Adaptation Strategy	Medium term		Dependent on the strategies to be implemented.

12.2 Social

Table 30: Action Plan to develop the place greening program

S1: Place Greening			
Strategic Outcome/Spin-offs	• Economic growth that is linked to sustainable resource use • Improved amenities and creating green aesthetic within the LM • Building sustainable communities	**Strategic Objectives**	• Promote self-sufficient , food security and sustainable livelihoods • To protect the LM's landscape • Undertake environmental vulnerability assessment to identify communities at risk
Issues Addressed	• Increased demand for development within the LM • Inefficient spatial planning and design	**Responsible Organization/s**	Ulundi LM - Environmental Unit & Community Development
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Identify priority areas in need of greening	Short term	EDTEA and DEFF	In-house
Develop Landscaping Master Plan for Ulundi LM,Prioritize public institutions i.e. by ensuring that their landscape designs incorporate the greening concept	Medium		Inhouse
Identify goals in terms of greening such amenity, food security, ecosystem goods and services. The goals may differ depending on areas identified. This should include an education component to ensure that communities take ownership of greening program and	Short term		In-house

responsibility for i.e. trees planted in the area			
Implement greening strategies	Ongoing		In-house
Identify and map areas with communities which are located on environmental sensitive areas	Short term		In-house

Table 31: Action Plan to Review Integrated Waste Management Plan

S3: Review Integrated Waste Management Plan			
Strategic Outcome	• Sustainable Waste Management that includes all aspects of the waste hierarchy	**Strategic Objectives**	• To provide basic services that meet the populations needs without compromising the system from which the services are obtained
Issues Addressed	• Land degradation, solid waste and stormwater management impact on water and aquatic ecosystem's quality • The lack of basic services such as effective waste removal and the provision of appropriate sanitation and water services impact on human health and well-being and result in a deterioration of the quality of life	**Responsible Organization/s**	• Ulundi LM - Environmental Unit & Community Development
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Review the IWMP	Medium	EDTEA	Inhouse
Undertake public awareness campaigns to support and promote strategies in the IWMP	Short term		In-house

12.3 Economic

Table 32: Action Plan to Integrate the SEA into SDF and LUMS Reviews

E1: Integrate SEA into SDF and LUMS Reviews			
Strategic Outcome	• Integrate planning approach that prioritise the environment	**Strategic Objectives**	• To promote sustainable environmental, social and economic development • To realise the value of the ecosystem goods and services • To promote efficient and sustainable use of natural resources
Issues Addressed	• Inappropriate development increase demand for natural resources and services	**Responsible Organization/s**	Ulundi LM - Environmental Unit, Project Management Unit, IDP section
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Use the consolidated constraints layer and status quo mapping as part of the SEA process as the basis for the next review of the SDF and LUMS	Short term	COGTA	In-house
Ensure that development proposed in terms of the SDF or LUMS is appropriate based on any environmental constraints identified			
Ensure that the SDF review or LUMS is based on extensive and inclusive public participation process			
Undertake a sustainability appraisal of			

the SDF and LUMS using sustainability framework as included in the SEA			

Table 33: Action Plan to undertake an Ecosystem Goods and Services Assessment

E2: Ecosystem Goods and Services Assessment			
Strategic Outcome	• Value of ecosystem and services is included in development planning	**Strategic Objectives**	• To promote sustainable use of natural resources • To emphasize the interdependence between poverty, economic growth and the environment
Issues Addressed	• The unequal distribution of wealth and resources, resulting in poverty which in-turn results in environmentally harmful practices which are causing environment ally and resource degradation	**Responsible Organization/s**	Ulundi LM - Environmental Unit, Housing and Planning Unit, Project Management Unit
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Identify priority systems for valuation such as wetlands, grasslands , open, spaces, areas which are habitat to rare species	Short term	Ezemvelo KZN Wildlife	In-house
Identify ecosystem goods and services found within the LM	Short term		Inhouse
Identify the preferred valuation methodology (benefit transfer, replacement cost etc.)	Short term		Inhouse
Collect the necessary information and	Short term		Inhouse

mapping (extent of ecosystem, ecosystem function and condition)			
Undertake valuation of ecosystem goods and services	Medium term		R10 000
Develop a score card of rating of impacts to ecosystem goods and services based on individual development applications	Medium term		R10 000
Develop an education program to communicate the value if ecosystem goods and services to communities	Ongoing		Inhouse

Table 34: Action Plan Undertake a Sustainability Appraisal of all Municipal Plan, Policies and Programs

E3: Sustainability Appraisal of all Municipal Plan, Policies and Programs			
Strategic Outcome	• All decision making takes into account environmental priorities	**Strategic Objectives**	• Ensure decision is sound and based on an understanding of the principles of sustainability
Issues Addressed	• Environmental issues are not considered a priority and insufficient resources are allocated to environmental functions	**Responsible Organization/s**	Ulundi LM - Environmental Unit & Housing and Planning Unit
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Using the sustainability framework from the SEA, develop a draft sustainability appraisal checklist	Short term	Ezemvelo KZN Wildlife & COGTA	In-house
Identify a few municipal projects as pilot appraisals to test the practicality of the checklist	Short term		
Amend and update the appraisal based on feedback	Short term		
Using the IDP identify all municipal Plans, Policies and Programms that should be subjected to sustainability	Short term		

appraisal			
Identify capacity needs to undertake sustainability appraisal (plan to complete all appraisal)	Short term		
Address capacity gaps and encourage public participation	Short term		
Undertake appraisals	Ongoing		
Continually review and amend the appraisal checklist	Ongoing		

12.4 Governance

Table 35: Action Plan to Undertake an Environmental Capacity Assessment

G1: Environmental Capacity Assessment			
Strategic Outcome	• Environmental issues are prioritized and Ulundi is committed to achieving environmental sustainability • Being able to make informed decision making	**Strategic Objectives**	• Ensure decision making is sound and based on an understanding of the principles of sustainability • Ensure compliance with the environmental legal policies • Be proactive in addressing environmental threats • Capacitate communities, officials and decision makers and build partnerships between these groups
Issues Addressed	Environmental issues are not considered a priority Insufficient resources are allocated to the environmental functions	**Responsible Organization/s**	Ulundi LM - Environmental Unit & Human Resources

Tasks	Timing	Potential Partners	Estimated Cost
Identify environmental capacity needs based on the implementation of the SEMP	Short term	EDTEA & DEA	In-house
Undertake an audit of existing environmental capacity within the LM	Short term		
Identify additional capacity requirements including additional staff, training, equipment and software	Short term		
Identify groups for sustainable training - Councilors, Officials, Traditional Authorities and Civil Society	Short term		
Identify training needs (language, levels of understanding of environmental issues and terminology)	Short term		
Design training course and training materials	Short term		Inhouse
Undertake training for different groups (training to be undertaken regularly as staff, councilors and I&APs change and grow)	Ongoing		inhouse

Table 36: Action Plan to make the SEA available on the Web

G2: Web-based SEA			
Strategic Outcome	• Greater access to the environmental information	**Strategic Objectives**	• Be pro-active in identifying and addressing environmental threats • Capacitating Interested and Affected Parties, Officials and decision makers
Issues Addressed	Limited collaboration between different stakeholders on matters pertaining to	**Responsible Organization/s**	Ulundi LM – Environmental Unit, GIS Unit & IT Unit

	environmental management		
Tasks	**Timing**	**Potential Partners**	**Estimated Cost**
Investigating the hosting agreement for the Ulundi website to ensure it is capable of hosting the SEA and associated data	Short term	EDTEA & DEA	In-house
Design a web page to enable the following: View SEA mapping • Identify a site based on a property description • Zoom in and out • Use SEA reporting tool	Short term		Inhouse
Notify the general public about the availability of the SEA and how to access it. The should be done through the media as well as notification of the identified I&APs	Short term		Municipal website

Table 37: Action Plan for Improved Cooperative Governance

G3: Co-operative Governance			
Strategic Outcome	• Decision making that is defensible clear and transparent • Access to environmental information is facilitated and encouraged • Communities are informed, empowered and involved in the process of democratic governance	**Strategic Objectives**	• Ensure decision making is sound based on an understanding of the principles of sustainability • Capacitating I&APs, Officials and decision makers
Issues Addressed	• Environmental issues not considered a priority • Insufficient resources are allocated to the environmental functions	**Responsible Organization/s**	Ulundi LM – Environmental Unit & Human Resources Unit

Tasks	Timing	Potential Partners	Estimated Cost
Establish the municipal environmental forum	Short term	EDTEA, DEFF, DARD, DWS, Department of Human Settlement, Department of Transport	In-house
Undertake the effective consultation to ensure attendance at established forum	Short term		In-house
Agree on roles and responsibilities	Short term		In-house
Provide feedback to provincial and national departments on participation of the environmental forum	Ongoing		In-house

13. Monitoring and Evaluation Plan

The proposed Monitoring and Evaluation Plan serves to determine whether the Ulundi SEA is achieving its intended objectives. The results from the monitoring and evaluation plan will feed into the review of the SEA and the plan provides a system to continuously improve the quality and accuracy of the SEA. It is critical that the SEA is reviewed regularly and the information gathered during the implementation of the SEA is used to improve the SEA over time. The process will be similar to the existing planning process currently undertaken by the LM to develop and review the IDP and SDF.

13.1 Roles and Responsibilities

Ulundi LM will be responsible for implementing the SEMP but should be supported by the provincial and national departments, as illustrated in Figure 51, below:

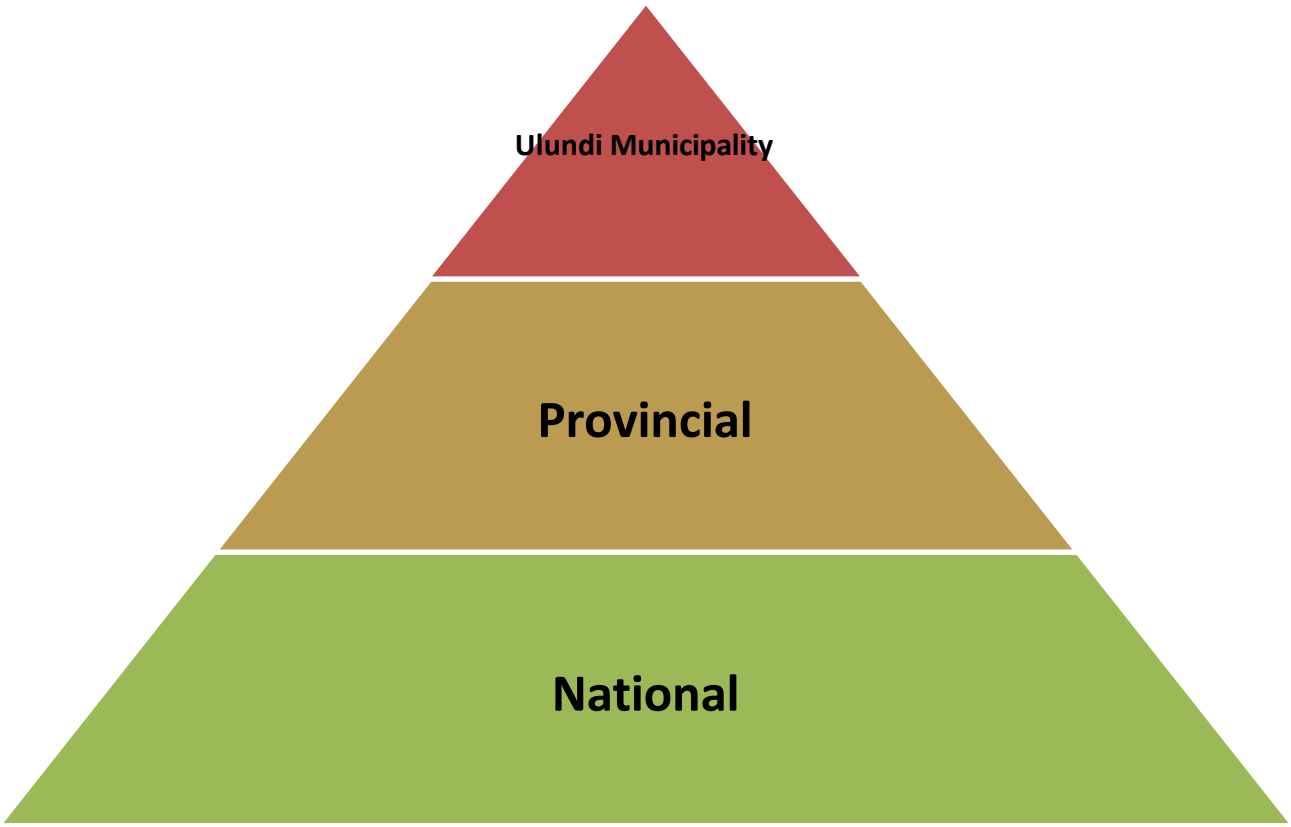


Figure 32: Role players in the Implementation of Ulundi SEMP

The roles and responsibilities in terms of implementing the SEMP are detailed below:

13.1.1 Ulundi Local Municipality

The roles and responsibilities of local government are outlined in Chapter 7 and schedules 4 and 5 of the Constitution. These responsibilities include governance functions such as development and implementations of by-laws, enforcement and cooperation with other spheres of government and cooperation with other spheres of government protection functions such as the creation and implementation of environment management plans as well management functions including service provision and associated management of impacts associated with the provision of services.

Ulundi LM does not only have the responsibility of managing the environmental impacts resulting from activities such as service provision but the LM also have the proactively implement measures to ensure that environmental degradation does not occur.

The SEMP identifies projects that Ulundi LM should implement in order to improve the LM's environmental state and actions plans contained in the SEMP should be operationalised through the IDP. Staff resources will be needed and budget in terms of the IDP planning process.

13.1.2 Provincial Departments

The Constitution establishes the foundation for environmental governance. As indicated above, the implementation of the SEMP rests with Ulundi LM, but the Constitution creates 'one system of government' consisting of three spheres namely, local, provincial and national government. The Bill of Rights places a duty on all three spheres of government to create 'reasonable legislative and other measures' in delivering the environmental right as contemplated by the Constitution. This duty means that government as a whole is responsible for ensuring sustainable development. The Constitution also places a duty on government to cooperate on environmental matters and introduces principles of cooperative government and intergovernmental relations.

The Constitution therefore requires that provincial government support and cooperates with Ulundi in the implementation of SEMP. Each action plan provided has identified potential partners. These partners are to a large extent in the provincial government and as minimum include:

- Department of Economic Development, Tourism and Environmental Affairs
- Department of Cooperative Government and Traditional Affairs
- Department of Human Settlement
- Department of Transport

13.1.3 National Departments

The Constitution places a duty on the National government as well, to support Ulundi LM in implementing the SEMP. The Department of Environmental Forest and Fisheries (DEFF) is the main role player in the environmental management at a National Level, but the Department of Water and Sanitation and other relevant National Departments also need to provide support to the implementation of the SEMP.

13.2 Documentation and Record Keeping

13.2.1 SEMP Review Period

Ulundi's Environmental Unit will champion the SEMP. The SEMP will be reviewed every 5 years. The action plans have therefore been written with a 5 year timeframe with the aim of achieving a longer term sustianability vision for the LM. Ulundi will be responsible for the review of the SEMP.

13.2.2 Monitoring

Timeframes for the monitoring of specific aspects and activities have been provided in the above - mentioned section 12. However, it is recommended that the results of the monitoring be consolidated and reported annually. It is recommended that the monitoring be undertaken by Ulundi Environmental Unit and reported to relevant structures.

13.3 Activities, Key Performance Indicators and Targets

Table 38: Activities, Key Performance Indicators and Targets

Activity	Key Performance Indicators	Targets
B1: Rivers and Wetlands Functionality Assessment	Valuation of river and wetlands goods and services	Improved rivers and wetlands functionality
B2: Rehabilitation of degraded land	Map of degraded land	Reduction of the % of areas regarded as degraded
B3: Alien Invasive clearing programme for land owned by Ulundi LM	Updated alien plant mapping	% of areas subject to alien infestation reduced
B4: Climate Change Vulnerability Assessment, Response and Adaptation Strategy	Climate change vulnerability identified and strategies in-place to address the risks	Ulundi LM protected against climate change risks
S1: Place Greening	Areas for greening identified and strategies in place to address greening needs	Effective use of open spaces
S2: Review Integrated Waste Management Plan	Reviewed Integrated Waste Management Plan	Average waste per resident reduced
E1:Integrate SEA into SDF and LUMS Review	SEA mapping included into SDF and LUMS Reviews	Environmental constraints informing planning
E2:Ecosystem Goods and Services Assessment	Ecosystem valuation and scorecard	No net loss of ecosystem goods and services
E3:Sustainability Appraisal of all Municipal Plan, Policies and Programs	Sustainability checklist	No sustainable development approved
G1: Environmental Capacity Assessment	Environmental capacity and gaps quantified	Sufficient capacity to address all environmental issues

G2: Web-based SEA	Interactive web-based environmental information system	Improved access to environmental information
G3: Cooperative Governance	Set of training materials	Greater cooperative governance